

Agriculture, Food & Natural Resources Career Cluster

1. Analyze how issues, trends, technologies and public policies impact systems in the Agriculture, Food & Natural Resources Career Cluster.

AG 1.1: Explain how regulations and major laws impact management of AFNR activities.

Sample Indicators:

- *Describe the major impacts of AFNR legislation.*
- *Describe the major regulations impacting the management of an individual resource.*
- *Identify situations that violate regulations.*

AG 1.2: Describe current issues impacting AFNR activities.

Sample Indicators:

- *Identify significant issues that impact work assignment.*

AG 1.3: Identify, organize alternatives, and evaluate public policy issues related to AFNR.

Sample Indicators:

- *Identify alternatives to an issue's potential solution.*
- *Evaluate alternatives for strengths and weaknesses.*
- *Recommend a solution based on research and analysis.*

AG 1.4: Consider public input in decision-making for AFNR activities.

Sample Indicators:

- *Identify impacts on the environment of a given animal management or production situation.*
- *List strategies to reduce or mitigate environmental impacts.*
- *Apply techniques to prevent potentially negative environmental impacts in an animal management or production situation.*

AG 1.5: Explain the impact of sustainability on ARNR activities and practices.

Sample Indicators:

- *Identify significant environmental and economic issues facing AFNR.*
- *List the potential economic, environmental, and social costs and benefits of enacting sustainability initiatives in AFNR.*

AG 1.6: Recognize the historical, social, cultural and potential applications of biotechnology on AFNR activities.

Sample Indicators:

- *Discuss the current applications of biotechnology in AFNR.*

AG.1.7: Demonstrate the application of biotechnology to AFNR activities.

Sample Indicators:

- *Explain how biotechnology is used in specific AFNR activities*

2. Evaluate the nature and scope of the Agriculture, Food & Natural Resources Career Cluster and the role agriculture, food and natural resources (AFNR) play in society and the economy.

AG 2.1: Examine company performance and goals within AFNR organizations and the AFNR industry.

Sample Indicators:

- *Examine the role and major functions of AFNR organizations to better utilize AFNR guidelines.*
- *Explain the major guidelines used by AFNR organizations to manage and improve performance while maintaining ecosystem health.*
- *Examine economic, social, and technological changes to spotlight their impact on AFNR organizations and the industry.*
- *Explain technological changes to reveal their impact on information technology and transportation.*

AG 2.2: Examine the role of AFNR in global, national, and regional economies.

Sample Indicators:

- *State the economic output of AFNR-related industries in the United States.*
- *Describe the role of global supply and demand on AFNR.*
- *Evaluate the impact of AFNR activities in your local community.*

AG 2.3: Explain the types of industries, organizations, and activities part of AFNR.

Sample Indicators:

- *Provide examples of AFNR organizations in each of the AFNR pathways.*
- *Explain the relationship between agriculture, food, and natural resources.*
- *Describe the role of government, multinational companies, regional companies, small businesses, entrepreneurs, and consumers in AFNR activities.*

AG 2.4: Explain the influence of AFNR on society.

Sample Indicators:

- *Identify ways in which the average person interacts with AFNR on a daily basis.*
- *Find examples of tradition, custom, or policy that result from practices in AFNR.*
- *Communicate the importance of AFNR to general public.*

3. Examine and summarize importance of health, safety and environmental management systems in AFNR organizations.

AG 3.1: Examine health risks associated with a particular skill to better form personnel safety guidelines.

Sample Indicators:

- *Define what level of possible contamination or injury is considered a risk in order to set safety priorities.*
- *Assess mental and physical stresses to determine all aspects necessary to perform well and what health risks are associated with both the mental and physical aspects.*

AG 3.2: Develop response plans to handle emergencies.

Sample Indicators:

- *Identify various emergency response plan requirements for a facility.*
- *Develop an emergency response plan for natural disasters.*

AG 3.3: Identify hazards and acquire first aid skills to promote environmental safety.

Sample Indicators:

- *Identify general workplace safety hazards.*
- *Apply general workplace safety precautions/procedures.*
- *Acquire and maintain first aid certification.*
- *Acquire and maintain cardiopulmonary resuscitation (CPR) certification.*
- *Respond to medical emergencies.*
- *Explain purpose of pollution control systems.*
- *Describe procedures to comply with environmental regulations.*
- *Maintain environmental health and safety facilities.*
- *Handle chemicals and safety equipment appropriately.*
- *Explain ergonomic procedures.*
- *Assess workplace safety.*
- *Assess a safety-training plan.*
- *Observe all regulatory and safety standards.*

AG 3.4: Examine required regulations to maintain/improve safety, health and environmental management systems and sustainable business practices.

Sample Indicators:

- *Study appropriate resources to identify the major regulatory areas (e.g., personal protective equipment) and government laws and regulations.*
- *Examine the major system components to realize benefits of health, safety, and environmental management systems in AFNR organizations.*
- *Measure or estimate benefits to explain how government agencies promote compliance and improved health, safety, and environmental performance to AFNR organizations.*
- *Examine logistics, distribution, and transportation organizations to explain how AFNR organizations promote improved health, safety, and environmental performance.*

AG 3.5: Enact procedures that demonstrate the importance of safety, health, and environmental responsibilities in the workplace.

Sample Indicators:

- *Establish a set of safety, health, and environmental principles to ensure a high level of performance.*
- *Develop a pollution/waste prevention plan to reduce or eliminate waste.*

AG.3.6: Demonstrate methods to correct common hazards.

Sample Indicators:

- *Identify and describe common hazards in the workplace.*
- *Identify and describe major sources of information about hazards in the workplace (e.g., MSDS, work procedures, exposure control plans, training materials, labels, and signage).*
- *Identify sources of combustible/flammable materials, fire, and emergencies to establish a fire-safe environment.*
- *Interpret safety signs and symbols.*

AG.3.7: Demonstrate application of personal and group health and safety practices.

Sample Indicators:

- *Identify procedures necessary for maintaining a safe work area.*
- *Identify methods to correct common hazards.*
- *Identify methods for disposing of hazardous materials.*
- *Demonstrate principals of safe physical movement to avoid slips, trips, and spills.*
- *Inspect and use protective equipment (PPE).*

4. Demonstrate stewardship of natural resources in AFNR activities.

AG.4.1: Demonstrate evidence of interest and concern for natural resource stewardship.

Sample Indicators:

- *Explain how personal choices are related to natural resource sustainability.*
- *Describe strategies to help an organization create a culture of natural resource stewardship.*

AG.4.2: Explain the environmental considerations of decision making in AFNR management.

Sample Indicators:

- *Predict the positive and negative impacts of given AFNR activities.*

5. Describe career opportunities and means to achieve those opportunities in each of the Agriculture, Food & Natural Resources Career Pathways.

AG.5.1: Locate and identify career opportunities that appeal to personal career goals.

Sample Indicators:

- *Locate and interpret career information for at least one career cluster.*
- *Identify job requirements for career pathways.*
- *Identify educational and credentialing requirements for career cluster and pathways.*

AG.5.2: Match personal interest and aptitudes to selected careers.

Sample Indicators:

- *Identify personal interests and aptitudes.*
- *Identify job requirements and characteristics of selected careers.*
- *Compare personal interests and aptitudes with job requirements and characteristics of career selected.*
- *Modify career goals based on results of personal interests and aptitudes with career requirements and characteristics.*

AG.5.3: Provide examples and descriptions of various careers in each of the AFNR pathways.

Sample Indicators:

- *List examples of careers that require various levels of postsecondary education in each AFNR pathway.*
- *Explain the primary benefit of having a career in each of the AFNR pathways.*

6. Analyze the interaction among ANFR systems in the production, processing and management of food, fiber and fuel and sustainable use of natural resources.

AG.6.1: Explain foundational cycles and systems of AFNR.

Sample Indicators:

- *Explain the typical plant and animal life cycle.*
- *Explain nutrient and water cycles.*
- *Describe basic plant and animal production cycles.*

AG.6.2: Explain the interconnectedness of systems within AFNR.

Sample Indicators:

- *Describe how various systems (e.g., soil, water, economic, plant, insect, livestock production) are impacted by the production practices of a give crop such as corn or alfalfa.*
- *Explain how changes in one system in AFNR can benefit and cost components of other systems. (e.g., using less irrigation water and the impact on soli systems, economic systems, watersheds)*

Agribusiness Systems Career Pathway (AG-BIZ)

1. Apply management planning principles in AFNR business enterprises.

AG-BIZ 1.1: Develop a mission statement and related goals and objectives to guide business activities.

Sample Indicators:

- *Identify planning approaches for preparing mission statement.*
- *Write a mission statement.*

- *Establish short- and long-term goals.*
- *Ask for feedback from stakeholders to test the impact of the mission statement.*
- *Disseminate mission statement to inform fellow employees and gain in-house support.*

AG-BIZ 1.2: Apply management skills to organize an AFNR enterprise or business unit.

Sample Indicators:

- *Identify management types.*
- *Identify organizational structures.*
- *Identify time management techniques.*
- *Make business agreements.*
- *Follow local, state, and federal regulations and appreciate the consequences of not following them.*
- *Recruit, train, and evaluate human resources.*
- *Make business presentations.*

2. Use record keeping to accomplish AFNR business objectives, manage budgets, and comply with laws and regulations.

AG-BIZ 2.1: Employ fundamental accounting principles in business bookkeeping and associated financial files.

Sample Indicators:

- *Budget resources (e.g., capital, human, financial, time).*
- *Manage assets for optimum utilization.*
- *Manage risk of liabilities.*
- *Evaluate credit uses and options.*
- *Prepare and interpret financial statements (e.g., balance sheet, profit/loss statement, cash flow statement).*
- *Prepare tax forms (e.g., W-4, I9, Depreciation, 1099, Workers Compensation).*
- *Determine cost of doing business.*
- *Compare and examine advantages and disadvantages of banking procedures (e.g., bank reconciliation).*
- *Analyze investment options (e.g., buy, lease, finance, risk).*

AG-BIZ 2.2: Prepare and maintain all files as needed for effective record keeping practices.

Sample Indicators:

- *Identify information management systems.*
- *Develop record keeping techniques and practices.*
- *Keep production and agribusiness records.*
- *Make records analysis.*

3. Manage cash budgets, credit budgets and credit for an AFNR business using generally accepted accounting principles.

AG-BIZ 3.1: Employ fundamental accounting principles in business bookkeeping and associated financial files.

Sample Indicators:

- *Budget resources (e.g., capital, human, financial, time).*
- *Manage assets for optimum utilization.*
- *Manage risk of liabilities.*
- *Evaluate credit uses and options.*
- *Prepare and interpret financial statements (e.g., balance sheet, profit/loss statement, cash flow statement).*
- *Prepare tax forms (e.g., W-4, I9, Depreciation, 1099, Workers Compensation).*
- *Determine cost of doing business.*
- *Compare and examine advantages and disadvantages of banking procedures (e.g., bank reconciliation).*
- *Analyze investment options (e.g., buy, lease, finance, risk).*

4. Develop a business plan for an AFNR enterprise or business unit.

AG-BIZ 4.1: Identify strategies to manage or mitigate risk.

Sample Indicators:

- *Identify sources of risk for an AFNR operation.*
- *Explain risk management strategies common across all industries and strategies specific to AFNR operations.*
- *Match appropriate risk management strategies to risk situations in an AFNR operation.*

AG-BIZ 4.2: Develop business goals and strategies that capitalize on opportunities in an AFNR market.

Sample Indicators:

- *Evaluate market opportunities.*
- *Establish mission and vision for AFNR enterprise or business unit.*
- *Write business goals that are clear, specific, realistic, and aligned to the mission and vision of the organization.*
- *Define the purpose, customers, and goals of the business.*
- *Prepare a one-year and multiple-year projected budget for the business.*

AG-BIZ 4.3: Develop an operation and/or production plan to provide required levels of product or service.

Sample Indicators:

- *Identify the resources required for operation or production of an AFNR enterprise or business unit.*

- Calculate costs of carrying inventory.
- List the components of a supply chain in an AFNR enterprise or business unit.

AG-BIZ 4.4: Analyze the strengths, weaknesses, opportunities, and threats to an AFNR enterprise or business unit.

Sample Indicators:

- Collect feedback from shareholders, stakeholders, and outside sources.
- Describe the opportunities and threats unique to AFNR operations.
- Analyze strengths and weakness of an AFNR enterprise or business unit compared to peer organizations.

5. Use sales and marketing principles common to agribusiness systems to accomplish AFNR business objectives.

AG-BIZ 5.1: Develop a mission statement and related goals and objectives to guide business activities.

Sample Indicators:

- Identify planning approaches for preparing mission statement.
- Write a mission statement.
- Establish short- and long-term goals.
- Ask for feedback from stakeholders to test the impact of the mission statement.
- Disseminate mission statement to inform fellow employees and gain in-house support.

Animal Systems Career Pathway (AG-ANI)

1. Analyze historic and current trends impacting the animal systems industry.

AG-ANI 1.1: Explain the variety and scope of managed animal systems in the United States and around the world including: livestock, poultry, aquaculture, companion animals, zoo animals and exotic animals.

Sample Indicators:

- List the major livestock produced in each region of the world.
- Describe the scope and economic impact of the companion animal industry.

AG-ANI 1.2: Explain the historical development of animal systems around the world..

Sample Indicators:

- Identify the origin of major livestock, poultry and companion animal species and breeds.
- Describe major changes in animal systems over the past 100 years. (e.g., greater confinement of livestock and poultry)
- Explain how characteristics of animals developed over time in response to animals' environments and selection efforts of humans..

AG-ANI 1.3: Describe trends in the animal systems industry.

Sample Indicators:

- *Explain how animal systems are influenced by a country's economic growth and development.*
- *Describe emerging careers related to animal systems.*
- *Identify impacts of technology on animal system.*

AG-ANI 1.4: Recognize the historical, social, cultural and potential applications of biotechnology in the animal systems industry.

Sample Indicators:

- *Provide examples of how biotechnology has been used to solve an issue in the animal systems industry.*

2. Utilize best practice protocols for husbandry and welfare based upon animal behaviors.

AG-ANI 2.1: Develop a safety plan for working with a specific animal.

Sample Indicators:

- *Explain factors that serve to stimulate or discourage given types of animal behavior.*
- *Recognize the normality curve of animal behavior.*
- *Perform safe handling procedures when working with animals.*
- *Identify strengths and weaknesses of an animal safety handling plan.*
- *Operate animal facilities to insure safety of animals.*

3. Design and provide proper animal nutrition given desired outcomes for performance, development, reproduction and/or economic production.

AG-ANI 3.1: Examine animal developmental stages.

Sample Indicators:

- *Recognize the different phases of an animal's life cycle.*
- *Select diets which provide the appropriate quantity of nutrients for each animal developmental stage.*
- *Explain why nutrient requirements are different throughout an animal's life cycle.*

AG-ANI 3.2: Assess whether the nutritional requirements of a given animal are being met by recording performance and comparing feed variations.

Sample Indicators:

- *Use different types of feedstuffs (e.g., roughage, concentrates) to create a feed ration containing the appropriate amounts of required nutrients.*
- *Use different forms of feedstuffs (e.g., pellets, cracked, rolled, ground) to create a diet that meets the needs of a specific animal.*

AG-ANI 3.3: Design a nutritional plan for a given animal with a clearly stated outcome.

Sample Indicators:

- Calculate nutrient requirements.
- Analyze nutritional value of feedstuffs.
- Evaluate proposed plan for effectiveness and economic feasibility.
- Create a balanced ration for a given animal.

4. Apply principles of animal reproduction given desired outcomes for performance, development and/or economic production.

AG-ANI 4.1: Evaluate animals for breeding readiness and soundness.

Sample Indicators:

- Summarize factors that contribute to reproductive maturity.
- Identify reproductive challenges that can arise from the anatomy or physiology of the male or female reproductive system.

AG-ANI 4.2: Apply scientific techniques in breeding of animals.

Sample Indicators:

- Design a breeding systems based on understanding of genetics.
- Explain the processes of natural and artificial breeding methods.
- Explain the use of quantitative breeding values (e.g., EPDs) in the selection of animals for breeding.
- Explain the use of reproductive management practices including estrous synchronization, embryo transfer and superovulation.

AG-ANI 4.3: Evaluate the male and female reproductive systems in a given animal species.

Sample Indicators:

- Identify the parts of male and female reproductive tracts on example animals.
- Analyze the reproductive cycle of a given animal.
- Explain the function of components in the male and female reproductive systems.

AG-ANI 4.4: Demonstrate the application of biotechnology to AFNR activities.

Sample Indicators:

- Discuss the role of biotechnology in animal reproduction.

5. Evaluate environmental factors affecting animal performance and implement procedures for enhancing performance and animal health.

AG-ANI 5.1: Reduce or mitigate the environmental impacts of animal management or production.

Sample Indicators:

- Identify impacts on the environment of a given animal management or production situation.

- *List strategies to reduce or mitigate environmental impacts.*
- *Apply techniques to prevent potentially negative environmental impacts in an animal management or production situation.*

AG-ANI 5.2: Describe the effects of environmental conditions on animals.

Sample Indicators:

- *Describe optimal environmental conditions for a given animal.*
- *Use equipment and facilities that contribute to optimal environmental conditions.*

6. Classify, evaluate and select animals based on anatomical and physiological characteristics.

AG-ANI 6.1: Classify animals by hierarchical taxonomy and use.

Sample Indicators:

- *Describe use of biological rank-based classification for animals.*
- *List the classification of common livestock, poultry and companion animals.*
- *Explain ways animals can be classified by use (e.g., agricultural use)*
- *Explain how breeds are used to classify animals of the same species.*

AG-ANI 6.2: Describe basic functions of animal cells, organs and systems.

Sample Indicators:

- *Diagram a typical animal cell.*
- *Describe the properties, locations and functions of types of animal tissue and organs.*
- *Identify major animal systems and describe function.*

AG-ANI 6.3: Explain how the components and systems of animal anatomy and physiology relate to the production and use of animals.

Sample Indicators:

- *Describe how skeletal and muscular systems relate to the production of meat and/or milk in livestock animals.*
- *Describe how skeletal system structure and movement impacts use of horses..*

AG-ANI 6.4: Select animals for specific purposes and maximum performance based on anatomy and physiology.

Sample Indicators:

- *Identify anatomical or physiological disorders common in companion animals.*
- *Select animals to maximize performance based on anatomical and physiological characteristics that affect growth and reproduction.*
- *Evaluate an animal against its optimal anatomical and physiological characteristics.*

7. Apply principles of effective animal health care.

AG-ANI 7.1: Implement a prevention and treatment program for animal diseases, parasites and other disorders for a given animal.

Sample Indicators:

- *Perform health-check evaluations on animals.*
- *Treat common diseases, parasites and physiological disorders of animals.*
- *Design an animal health prevention and treatment program.*

AG-ANI 7.2: Perform surgical and nonsurgical veterinary treatments and procedures.

Sample Indicators:

- *Explain the clinical significance of common considerations of veterinary treatments,*
- *Prepare animals, facilities and equipment for surgical and nonsurgical veterinary treatments and procedures.*

Environmental Service Systems Pathway (AG-ENV)

8. Use analytic procedures and instruments to manage environmental systems activities.

AG-ENV 1.1: Monitor samples using a variety of instrumentation.

Sample Indicators:

- *Operate basic laboratory equipment and environment-monitoring instruments (e.g., pH meter/ISE meter, compound microscope/dissecting microscope, sound level measuring devices, turbidimeter, conductivity meter, chlorine meter OVA, HNMU).*
- *Perform chemical laboratory sample preparation.*
- *Perform analytical separation techniques.*
- *Perform spectroscopic analysis using instruments such as: spectrophotometer/auto spectrophotometer, AA/graphite furnace, ICP, GC/MS, oxygen meter, IC, IR, FTIR X-ray diffraction nitrogen analyzer, mercury analyzer, FID/PID analyzer, and RAD meter.*
- *Operate advanced laboratory and field equipment and instruments (e.g., HPLC, GC, bomb calorimeters, Geiger Mueller counters, explosimeters, specific gas meters, carbon analyzers, microwaves).*
- *Use computers to interface with chemical analytical instruments.*
- *Perform instrumental analysis (e.g., mass spectrometers, chromatographs, electron microscopes).*

AG-ENV 1.2: Analyze and interpret results of sample measurements.

Sample Indicators:

- *Apply basic statistics concepts.*

- *Interpret scattergrams.*
- *Analyze probability theories.*
- *Determine control limits.*
- *Determine process capability.*
- *Prepare and evaluate charts.*
- *Conduct process improvement studies.*
- *Interpret quantitative and graphic output from chemical analysis instruments.*

AG-ENV 1.3: Calibrate and service field equipment and instruments according to manufacturer's specifications.

Sample Indicators:

- *Maintain instruments using gas systems.*
- *Calibrate chemical analytical instruments.*
- *Operate and maintain flow instrument systems.*
- *Operate and maintain pressure test instruments (e.g., manometers, vacuum pumps, pressure and vacuum gages).*
- *Service thermal measuring instruments.*
- *Service physical property (e.g., sample control) measuring instruments.*
- *Service chemical property measuring instruments (e.g., O₂ meter, spectrophotometer, atomic absorption spectrophotometer, inductively coupled plasma, ion chromatography, infrared).*

9. Evaluate the impact of public policies and regulations on environmental services facility operations.

AG-ENV 2.1: Identify the major laws impacting environmental services by consulting reliable resources or participating in trainings.

Sample Indicators:

- *Identify key components of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).*
- *Identify requirements of the Superfund Amendment Reauthorization Act (SARA).*
- *Identify requirements of waste and material transportation.*
- *Describe job-related activities subject to the Occupational Safety and Health Administration (OSHA).*
- *Describe requirements of the Resource Conservation and Recovery Act (RCRA).*
- *Explain requirements of the Clean Water Act.*
- *Explain requirements of the Safe Drinking Water Act (SDWA).*
- *Explain requirements of the Clean Air Act.*
- *Identify requirements of the Nuclear Waste Policy Act.*
- *Identify key components of ISO 14000.*

10. Develop proposed solutions to environmental issues, problems, and applications using scientific principles of meteorology, soil science, hydrology, microbiology, chemistry, and ecology.

AG-ENV 3.1: Recognize weather systems and weather patterns using meteorological principles and knowledge.

Sample Indicators:

- *Identify the components of the earth's atmosphere.*
- *Explain basic meteorology principles.*

AG-ENV 3.2: Describe soil compositions and properties to demonstrate knowledge of soil science.

Sample Indicators:

- *Describe soil geology.*
- *Describe composition of soil.*
- *Describe the biological properties of soil.*
- *Identify the physical properties of soil.*
- *Describe the chemical properties of soil.*
- *Test soil samples to determine characteristics.*
- *Explain classification of soil water.*
- *Explain the relationship between soil classifications and land use.*

AG-ENV 3.3: Explain well design and groundwater supplies using knowledge of hydrology.

Sample Indicators:

- *Explain hydrology.*
- *Explain geological and meteorological principles affecting groundwater supply.*
- *Conduct channel flow analysis.*
- *Identify basic criteria for water well design.*
- *Identify differences in groundwater potential.*
- *Identify environmental hazards associated with groundwater supplies.*

AG-ENV 3.4: Use chemical analysis to conduct tests.

Sample Indicators:

- *Explain basic chemistry principles (e.g., elements, compounds).*
- *Apply chemical laboratory skills.*

AG-ENV 3.5: Perform common microbiology procedures to examine cell types and conduct tests.

Sample Indicators:

- *Conduct bioassay tests.*
- *Identify groups of microorganisms.*
- *Analyze factors affecting microbial growth.*

AG-ENV 3.6: Apply sampling techniques and other assessments using procedures and principles from the study of microbiology.

Sample Indicators:

- *Apply microbiological principles and procedures.*
- *Explain immunological procedures.*
- *Describe roles of microorganisms in the environment.*
- *Explain microbial growth.*
- *Describe influence of environmental factors on microbes.*
- *Demonstrate the use of fundamental statistics in sampling practices.*

AG-ENV 3.7: Apply chemistry principles to environmental service systems.

Sample Indicators:

- *Distinguish the characteristics of inorganic and organic compounds related to environmental service systems.*
- *Apply standard operating procedures for use and management of chemicals in environmental service systems.*

AG-ENV 3.8: Discuss properties, classifications, functions, and principles for managing wetlands.

Sample Indicators:

- *Explain wetlands classification.*
- *Explain the function of wetlands.*
- *Describe the living components of wetland habitats.*
- *Delineate wetlands.*
- *Identify techniques used in wetland management, enhancement, and restoration programs.*
- *Identify principles used in wetland mitigation and restoration.*

AG-ENV 3.9: Discuss properties, classifications, functions, and principles for managing watersheds.

Sample Indicators:

- *Identify properties of watersheds.*
- *Explain watershed management.*
- *Delineate watersheds.*
- *Assess source water.*

Food Products & Processing Systems (AG-FD)

1. Develop and implement procedures to ensure safety, sanitation, and quality in food product and processing facilities.

AG-FD 1.1: Implement Hazard Analysis and Critical Control Point (HACCP) procedures.

Sample Indicators:

- *Describe the principles of HACCP.*

- *Outline procedures to eliminate possible contamination hazards associated with food products and processing.*

AG-FD 1.2: Develop operational procedures and maintenance plans for food processing equipment and facilities.

Sample Indicators:

- *Develop and maintain a Standard Sanitation Operating Procedure (SSOP).*
- *Explain and demonstrate Good Manufacturing Practices (GMP).*
- *Perform equipment and facility maintenance in a food product and processing operation.*
- *Practice worker safety procedures.*

AG-FD 1.3: Employ safety and sanitation procedures for the handling, processing, and storage of food products.

Sample Indicators:

- *Explain techniques and procedures for safe handling of food products.*
- *Perform quality-assurance tests on food products.*
- *Demonstrate approved food product handling techniques.*
- *Explain the importance of microbiological tests in food product preparation.*

2. Apply principles of nutrition, biology, microbiology, chemistry, and human behavior to development of food products.

AG-FD 2.1: Execute key processes related to food product development and enhancement.

Sample Indicators:

- *Conduct research.*
- *Apply the use of chemistry.*
- *Comply with and apply USDA/FDA standards.*
- *Use product development (e.g., consumer opinion, taste testing).*
- *Conduct nutritional analysis (e.g., biochemistry).*
- *Compare and contrast the nutritive value of food groups.*
- *Identify and compare various food constituents.*

AG-FD 2.2: Field-test a food product for consumer acceptance.

Sample Indicators:

- *Describe human behaviors related to food.*
- *Plan a field test for a new food product.*
- *Perform sensory testing of a new food product with consumers.*

AG-FD 2.3: Analyze a food product to identify food constituents.

Sample Indicators:

- *Compare the nutritive value of food.*
- *Describe common food constituents (e.g., fats, vitamins, proteins)*
- *Explain how food constituents (proteins, minerals, etc.) contribute to product taste and appearance.*

AG-FD 2.4: Determine the physical and chemical properties of a food product.

Sample Indicators:

- *Identify the required information for a food label.*
- *Explain the function of common food additives.*
- *Predict the effects of altering a food product's formulation.*

3. Select and process food products for storage, distribution, and consumption.

AG-FD 3.1: Evaluate and grade food products.

Sample Indicators:

- *Evaluate, grade, and classify meat, egg, fish, poultry, and dairy products.*
- *Evaluate, grade, and classify processed fruit and vegetable products.*
- *Evaluate, grade, and classify grain, legume, and oilseed products.*

AG-FD 3.2: Process food products for sale and distribution.

Sample Indicators:

- *Formulate food packages based on standard weights and measures.*
- *Prepare fresh food products for distribution and sale.*
- *Preserve foods through a variety of techniques.*
- *Select packaging for storage of processed foods.*
- *Evaluate storage conditions for food quality, shelf life, and indented use.*

AG-FD 3.3: Use harvesting, selection, and selection techniques to obtain quality food products for processing and distribution.

Sample Indicators:

- *Assign quality grades and yield grades to food products according to industry standards.*
- *Perform quality-assurance inspections of raw food products.*
- *Describe acceptable animal treatment and harvesting techniques.*

4. Explain the scope of the food industry and the historical and current developments of food products and processing.

AG-FD 4.1: Explain the participants and their relationships in the food industry.

Sample Indicators:

- *Describe the role of producers, wholesale buyers, ingredient manufacturers, merchandisers, processors, distributors, and retailers in the food industry.*
- *Explain the relationships among participants in the food industry for a given food product.*

AG-FD 4.2: Describe historical developments in food products and processing.

Sample Indicators:

- *Describe technological advancements that impacted food processing, storage, and distribution.*
- *Explain how environmental and GMO concerns about food products have impacted the food industry.*
- *Discuss food safety issues raised by consumers over time and the resulting impact on the food industry.*
- *Predict trends and their impact on the future of food production and processing.*

AG-FD 4.3: Explain the role of industry associations, governmental agencies, and other organizations in the food industry.

Sample Indicators:

- *Discuss the application of industry standards in food products and processing.*
- *Explain the importance of industry standard grading systems for food products and processing.*
- *Identify examples of collaboration between industry associations, governmental agencies, and other organizations related to a food industry issue.*

AG-FD 4.4: Recognize the historical, social, cultural and potential applications of biotechnology on food products and processing.

Sample Indicators:

- *Explain the costs and benefits of biotechnology applications in food products and processing.*

Natural Resources Systems (AG-NR)

1. Plan and conduct natural resource management activities that apply logical, reasoned, and scientifically based solutions to natural resource issues and goals.

AG-NR 1.1: Recognize weather and other natural hazards related to working in an outdoor environment.

Sample Indicators:

- *Recognize weather-related dangers.*
- *Recognize hazards as they relate to terrain.*
- *Recognize poisonous plants and animals.*
- *Recognize hazardous situations at the work location.*

AG-NR 1.2: Apply cartographic skills to the planning, implementing, and evaluating natural resource activities.

Sample Indicators:

- *Describe different types of maps.*
- *Interpret map features and legend.*
- *Determine map scale and actual distance.*
- *Determine direction from map.*
- *Determine elevation and terrain features from topographic maps.*
- *Use directional tools with map to locate position.*
- *Use land survey and coordinate system.*
- *Use a Geographic Information System (GIS) to interface geospatial data.*
- *Interpret photos and images.*

AG-NR 1.3: Obtain and analyze data by monitoring natural resource status.

Sample Indicators:

- *Conduct resource inventory and population studies.*
- *Establish sample plots and points.*
- *Locate and identify resources.*
- *Collect data concerning resource availability and health.*
- *Maintain databases of resource data.*
- *Use a Geographic Information System (GIS) to analyze resource data.*
- *Prepare a technical report.*
- *Describe the relationship of harvest levels to long-term availability of resources.*

AG-NR 1.4: Explain the application of laws and regulations related to natural resource systems.

Sample Indicators:

- *Identify applicable laws and regulations.*
- *List federal, state, and local agencies that carry out laws and regulations related to natural resource systems.*

AG-NR 1.5: Execute natural resource strategies and activities applying scientific knowledge from the study of ecology and wildlife.

Sample Indicators:

- *Demonstrate stream enhancement techniques.*
- *Demonstrate forest stand improvement techniques.*
- *Demonstrate wildlife habitat enhancement techniques.*
- *Demonstrate range enhancement techniques.*
- *Demonstrate recreation area enhancement techniques.*

2. Plan and Analyze interrelationships between natural resources and humans needed to manage natural resource systems.

AG-NR 2.1: Examine natural resource topics using science concepts, processes, and research techniques.

Sample Indicators:

- *Develop a research/monitoring plan to inquire about a natural resource topic.*
- *Conduct a research/monitoring activity for a natural resource topic.*
- *Evaluate the results of a natural resource-related inquiry.*
- *Produce a technical report of results/findings*

AG-NR 2.2: Examine biological and physical characteristics to identify and classify natural resources.

Sample Indicators:

- *Identify tree species and other woody vegetation.*
- *Identify grass and forage species.*
- *Identify wildlife species.*
- *Identify fish species.*
- *Identify rocks, minerals, and soil types.*

AG-NR 2.3: Examine natural cycles and related phenomena to describe ecologic concepts and principles.

Sample Indicators:

- *Describe the hydrologic cycle.*
- *Describe the nitrogen cycle.*
- *Describe the carbon cycle.*
- *Describe nutrient cycles.*
- *Describe succession.*
- *Describe population dynamics.*
- *Describe primary and secondary producers.*
- *Describe predator-prey relationships.*
- *Identify potential pollution sources.*
- *Define watershed boundaries.*
- *Use stream classification system.*
- *Describe the influence of weather and climatic factors.*

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3. Develop plans to ensure responsible and sustainable production and processing of natural resources.

AG-NR 3.1: Plan for the production, harvesting, processing, and/or use of natural resources in a responsible and sustainable manner.

Sample Indicators:

- *Describe forest harvest techniques and procedures.*
- *Describe wildlife harvest techniques and procedures.*
- *Describe fish harvest techniques and procedures.*
- *Describe how minerals and ores are extracted and processed.*
- *Describe how oil is extracted and processed.*
- *Describe hydroelectric generation techniques and procedures.*
- *Describe how public recreation use is a product.*
- *Develop plans for production, use, or harvesting of a natural resource in a given environment.*

4. Demonstrate responsible control and management procedures and techniques to protect or maintain natural resources.

AG-NR 4.1: Employ techniques and equipment needed to manage and/or prevent fire.

Sample Indicators:

- *Demonstrate personal fire prevention precautions while working in natural environments.*
- *Participate in wildfire prevention community service project.*
- *Explain the use of prescribed burns.*
- *Meet industry standards for fire suppression training (e.g., National Wildfire Coordinating Group Firefighter Certification Standards).*

AG-NR 4.2: Employ appropriate techniques to prevent the spread of animal and plant diseases affecting natural resource systems.

Sample Indicators:

- *Identify observable diseases impacting plants and animals.*

- *Describe how to report observance of disease infestations.*
- *Use appropriate techniques and equipment when working with bio-hazards.*

AG-NR 4.3: Manage invasive species infestations that threaten natural resource systems.

Sample Indicators:

- *Identify and classify insects.*
- *Identify insect damage signs.*
- *Describe how to report observance of insect infestation.*
- *Identify examples of invasive species that threaten natural resource systems.*
- *Plan for control techniques to manage spread of invasive species.*

Plant Systems (AG-PL)

1. Develop and implement a crop management plan for a given production goal that accounts for environmental factors.

AG-PL 1.1: Develop a fertilization plan using the results of an analysis and evaluation of nutritional requirements and environmental conditions.

Sample Indicators:

- *Describe nutrient sources.*
- *Determine plant nutrient requirements for optimum growth.*
- *Identify function of plant nutrients in plants.*
- *Determine the environmental factors that influence and optimize plant growth.*
- *Apply nutrients to plants for economic growth.*
- *Describe nutrient application methods and appropriate practices.*

AG-PL 1.2: Evaluate soil/media nutrients using tests of appropriate materials and/or by examining data.

Sample Indicators:

- *Collect and test soil/media and/or plant tissue.*
- *Interpret tests of soil/media and/or plant tissue.*
- *Identify soil slope, structure, and type.*
- *Evaluate soil/media permeability and water-holding capacity.*
- *Determine the chemical properties of soil/media.*
- *Determine land use capability.*
- *Determine the biological functions of microorganisms of soil/media.*

AG-PL 1.3: Determine the influence of environmental factors on plants.

Sample Indicators:

- *Describe plant response to light color, intensity, and duration.*

- *Determine the optimal and allowable air and soil temperature and water conditions for plant growth.*
- *Describe the optimal and allowable characteristics of the growing media for plant growth.*

AG-PL 1.4: Manage water conditions for plant growth.

Sample Indicators:

- *Explain how soil draining and water-holding capacity can be improved.*
- *Design an irrigation schedule that makes the most efficient use of irrigation water.*
- *Identify categories of soil water.*

AG-PL 1.5: Manage characteristics of growing media.

Sample Indicators:

- *Explain the various types and components of growing media.*
- *Describe techniques to reduce soil compaction.*
- *Modify composition of growing media to better meet plant growth needs.*

2. Apply the principles of classification, plant anatomy, and plant physiology to plant production and management.

AG-PL 2.1: Examine unique plant properties to identify/describe functional differences in plant structures including roots, stems, flowers, leaves, and fruit.

Sample Indicators:

- *Identify plant structures (e.g., seeds).*
- *Describe physiological functions of plants.*
- *Describe germination process and conditions.*

AG-PL 2.2: Classify plants based on physiology for taxonomic or other classifications.

Sample Indicators:

- *Classify plants as monocots or dicots.*
- *Classify plants as annuals, biennials, or perennials.*
- *Classify plants according to growth habit.*
- *Classify plants by type.*
- *Classify plants by economic value.*
- *Classify plants by agricultural use.*
- *List the scientific names and key characteristics of agriculturally important plants.*

AG-PL 2.3: Apply knowledge of plant anatomy and plant structures to plant systems activities.

Sample Indicators:

- *Identify root types, tissues, and components.*
- *Explain active and passive transport through root systems.*
- *Identify the components of plant stems.*

- *Explain translocation.*
- *Explain how plant management techniques can impact mineral transport and translocation.*
- *Identify the different types of flowers and flower forms.*
- *Explain how flower structures impact plant breeding and production.*
- *Describe the types and components of seeds and fruits.*
- *Explain how plants are managed for the production of seeds and fruit.*

AG-PL 2.4: Apply knowledge of plant physiology and energy conservation to plant systems activities.

Sample Indicators:

- *Explain how plant management relies on understanding of light-dependent and light-independent reactions of photosynthesis.*
- *Relate plant growth, management, and harvesting strategies in response to stages of cellular respiration in plants.*
- *Use plant growth regulators to product desired responses from plants.*

3. Propagate, culture, and harvest plants and plant products based on current industry standards.

AG-PL 3.1: Develop a production plan that applies the fundamentals of plant management.

Sample Indicators:

- *Identify and select seeds and plants*
- *Manipulate and evaluate environmental conditions (e.g., irrigation, mulch shading) to foster plant germination, growth and development.*
- *Evaluate and demonstrate planting practices (e.g., population rate, germination/seed vigor, inoculation, seed and plant treatments).*
- *Evaluate and demonstrate transplanting practices.*
- *Prepare soil/media for planting.*
- *Control plant growth (e.g., pruning, pinching, disbudding, topping, detasseling, staking, cabling, shearing, shaping).*
- *Prepare plants and plant products for distribution.*

AG-PL 3.2: Harvest crops using methods that apply fundamentals of plant management.

Sample Indicators:

- *Determine crop maturity.*
- *Identify harvesting practices and equipment.*
- *Demonstrate common harvesting techniques.*
- *Calculate yield and loss.*
- *Identify options for crop storage.*
- *Maintain quality of plants products in storage.*
- *Prepare plants and plant products for distribution.*

AG-PL 3.3: Handle crops using method that apply fundamentals of plant management.

Sample Indicators:

- *Demonstrate techniques for grading, handling, and packaging plants and plant products for distribution.*
- *Predict typical loss of plants or plant products in the process of handling, packing and/or distribution.*

AG-PL 3.4: Store crops using methods that apply fundamentals of plant management.

Sample Indicators:

- *Identify methods for storing plants and plant products.*
- *Explain how cellular respiration affects plant and plant product storage.*
- *Explain the proper conditions for storage of plants and plant products.*

AG-PL 3.5: Produce crops using a plant management plan.

Sample Indicators:

- *Inspect propagation material for pest and diseases,*
- *Prepare growing media/soil for planting.*
- *Prepare a schedule for production that accommodates environmental setting (natural, greenhouse, or modified).*
- *Demonstrate proper plant procedures and post-planting care.*
- *Control growth through mechanical, cultural, and mechanical means.*

AG-PL 3.6: Develop and implement an integrated pest management plan.

Sample Indicators:

- *Identify major weeds, beneficial insects, insect pests, and plant diseases for region and crop.*
- *Diagram the life cycles of major plant pests and diseases.*
- *Explain the proper selection and use of pesticide controls and formulations.*
- *Compare the risks and benefits of chemical and non-chemical pest controls.*

AG-PL 3.7: Demonstrate plant propagation techniques.

Sample Indicators:

- *Explain pollination, cross-pollination, and self-pollination of flowering plants.*
- *Design plants to control the pollination of flowering plants.*
- *Demonstrate seed-sowing techniques that result in favorable germination, viability, and vigor.*
- *Demonstrate proper procedures in budding or grafting plant materials.*
- *Propagate plants by micropropagation.*
- *Explain the principles and processes of recombinant DNA technology in plants.*
- *Compare plant breeding and genetic modification.*

AG-PL 3.8: Apply principles and practices of sustainable agriculture to plant production.

Sample Indicators:

- Calculate the economic, environmental, and human health costs and benefits of incorporating sustainable plant production practices.
- Plan the production of plants or plant products that incorporate sustainable practices.
- Identify the certifying options for crops and plants produced using sustainable techniques.

AG-PL 3.9: Demonstrate the application of biotechnology to plant production.

Sample Indicators:

- Explain the principles and processes of recombinant DNA technology in plants.
- List the current applications of biotechnology in plant production.

4. Apply principles of design in plant systems to enhance an environment (e.g., floral, forest landscape, and farm).

AG-PL 4.1: Create a design using plants that demonstrates an application of basic design elements and principles.

Sample Indicators:

- Conduct a site evaluation for physical condition and design implications.
- Apply elements of design (e.g., line, form, texture, color).
- Incorporate principles of design (e.g. space, scale, proportion, order).
- Use landscape design drawing tools including Computer-Aided Design (CAD) and industry-specific software.
- Select hard goods, supplies, and tools used in design.
- Select plant(s) for design.

Power, Structural & Technical Systems (AG-PST)

1. Apply physical science principles and engineering applications related to mechanical equipment, structures, and biological systems to solve problems and improve performance in AFNR power, structural, and technical systems.

AG-PST 1.1: Select energy sources for power generation.

Sample Indicators:

- Identify petroleum sources (e.g., gasoline, diesel).
- Identify alternative sources (e.g., ethanol, biodiesel, air, wood, geothermal, solar).
- Compare environmental impact of energy sources.
- Compare efficiency of energy sources.
- Compare characteristics of energy sources.
- Discuss efficiency of systems (e.g., fuel cells, chemical, wind, hydro, nuclear, electric, mechanical, solar, biological).

AG-PST 1.2: Use hand and power tools commonly required in power, structural, and technical systems

Sample Indicators:

- *Identify petroleum sources (e.g., gasoline, diesel).*
- *Demonstrate use of measurement tools.*
- *Demonstrate use of hand tools and instruments used for service, construction, and fabrication.*
- *Demonstrate use of power tools and instruments used for service, construction, and fabrication.*

AG-PST 1.3: Investigate solutions to AFNR power, structural, and technical systems.

Sample Indicators:

- *Use the scientific method to guide investigation.*
- *Apply knowledge of physical science principles to identify the cause of the problem and to brainstorm solutions.*
- *Use engineering approach in the design and testing of potential solutions.*

AG-PST 1.4: Design or modify equipment, structures, or biological systems to improve performance of an AFNR enterprise or business unit.

Sample Indicators:

- *Generate ideas that will improve performance.*
- *Build rapid prototypes to test ideas and new designs.*
- *Evaluate success of prototypes.*
- *Determine feasibility of full-scale production of new design or modification.*
- *Plan production of design or modification.*

2. Operate and maintain mechanical equipment related to AFNR power, structural, and technical systems.

AG-PST 2.1: Maintain machinery and equipment by performing scheduled service routines.

Sample Indicators:

- *Lubricate machinery and equipment.*
- *Ensure presence and function of safety systems and hardware.*
- *Service electrical systems.*
- *Perform machine adjustments (e.g., belts, drive chains).*
- *Service filtration systems.*
- *Maintain fluid levels.*
- *Maintain vehicle, machinery, and equipment cleanliness and appearance.*
- *Maintain fluid conveyance components (e.g., hoses and lines, valves, nozzles).*
- *Design a preventive maintenance schedule.*
- *Identify causes of malfunctions and failures.*
- *Calibrate metering, monitoring, and sensing equipment.*

AG-PST 2.2: Perform service routines to maintain power units and equipment.

Sample Indicators:

- *Test and service electrical systems.*
- *Troubleshoot malfunctions and failures in equipment.*
- *Service filtration systems on power units.*
- *Perform equipment lubrication.*
- *Develop a preventive maintenance schedule.*

AG-PST 2.3: Operate machinery and equipment while observing all safety precautions.

Sample Indicators:

- *Describe function of machine controls and instrumentation.*
- *Perform appropriate start-up procedures.*
- *Select proper machine(s) for specific task(s).*
- *Safely operate equipment.*
- *Perform pre-operation inspection.*
- *List applicable laws for on- and off-highway operation.*

3. Service and repair mechanical equipment and power systems used in AFNR power, structural and technical systems.

AG-PST 3.1: Service and repair the components of internal combustion engines using procedures for troubleshooting and evaluating performance.

Sample Indicators:

- *Describe principles of operation.*
- *Identify engine systems and components.*
- *Analyze and troubleshoot engines.*
- *Perform overhaul procedures.*
- *Evaluate engine performance through post-rebuild testing.*

AG-PST 3.2: Service and repair power transmission systems following manufacturer's guidelines.

Sample Indicators:

- *Describe features, benefits, and applications of various power transmission systems.*
- *Describe principles of operation of various power transmission systems.*
- *Perform calculations involving speed, torque, and power relationships.*
- *Describe features, benefits, and applications of mechanical transmission components (e.g., belts, chains, gears, bearings, seals, universals).*
- *Inspect, analyze, and repair hydrostatic transmissions.*
- *Inspect, analyze, and repair differentials and final drives.*
- *Inspect, analyze, and repair clutches and brakes.*
- *Inspect, analyze, and repair gear-type transmissions including power shift.*
- *Inspect, analyze, and repair auxiliary drives.*

AG-PST 3.3: Service and repair hydraulic systems by evaluating performance using maintenance manuals.

Sample Indicators:

- Describe features, benefits, and applications of types of hydraulic systems.
- Describe physical principles of operation.
- Interpret symbols and schematic drawings.
- Describe the application and operation of major components.
- Inspect, analyze, and repair hydraulic components (e.g., pumps, valves).
- Inspect, analyze, and repair fluid conveyance components (e.g., hoses, lines).
- Evaluate system cleanliness.
- Identify hydraulic fittings and ports.

AG-PST 3.4: Service and repair steering, suspension, traction, and vehicle performance systems by checking performance parameters.

Sample Indicators:

- Evaluate traction, ballasting, and weight transfer.
- Evaluate vehicle stability.
- Determine optimum vehicle performance, e.g., horsepower management, fuel efficiency.
- Troubleshoot, adjust, and repair suspension systems.
- Inspect and repair steering systems.

AG-PST 3.5: Execute the safe and proper use of construction/fabrication hand tools in the workplace.

Sample Indicators:

- Demonstrate proper use of measurement and layout tools.
- Apply proper use of measurement and layout tools in construction/fabrication of an actual project.
- Demonstrate safe and proper techniques in using hand and power tools in construction/fabrication.
- Demonstrate hand and power tool usage to construct/fabricate an actual project according to blueprints or plans.
- Identify and demonstrate proper hand and power tool maintenance procedures.

AG-PST 3.6: Service electrical systems by troubleshooting from schematics.

Sample Indicators:

- Describe features and applications of electrical systems.
- Interpret symbols and wiring diagrams.
- Test and troubleshoot electrical systems and components (e.g., battery, charging, starting, lighting, instrumentation, accessories).
- Troubleshoot and install instrumentation and data acquisition system (e.g., Global Positioning System (GPS), spraying, planting, harvesting monitors).
- Diagnose and repair control systems and sensors (e.g., engine, transmission, implement).

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4. Plan, build and maintain AFNR structures.

AG-PST 4.1: Create sketches and plans of agricultural structures.

Sample Indicators:

- *Use current technology to develop simple plans and sketches.*
- *Identify symbols and drawing techniques used to develop simple plans and sketches.*
- *Use scale measurement and dimension to develop simple plans and sketches.*

AG-PST 4.2: Apply structural plans, specifications, and building codes.

Sample Indicators:

- *Identify components of an architectural drawing.*
- *Complete appropriate local permit applications.*
- *Follow applicable structural codes.*

AG-PST 4.3: Determine requirements and estimate costs for construction materials and procedures.

Sample Indicators:

- *Identify criteria for materials based on use or application of structure.*
- *Prepare request for construction bid.*
- *Prepare a project cost estimate.*

AG-PST 4.4: Follow architectural and mechanical plans to construct AFNR structures.

Sample Indicators:

- *Construct metal structures using welding fabrication processes.*
- *Install glass, ridged panels, and/or film plastics.*
- *Construct with concrete, brick, stone or masonry.*
- *Insulate a structure.*
- *Construct wood or metal building frames.*
- *Install pipes and plumbing equipment and fixtures.*
- *Install electrical wiring and fixtures.*
- *Paint or protect with coatings.*

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

AG-PST 5.1: Execute procedures and techniques for monitoring and controlling electrical systems using basic principles of electricity.

Sample Indicators:

- *Show proficiency in use of various meters.*
- *Discuss importance of and techniques for grounding.*
- *Show understanding of codes and regulations.*
- *Discuss various energy sources.*

AG-PST 5.2 Design control systems by referencing electrical drawings.

Sample Indicators:

- *Develop and read schematic drawings for a control system.*
- *Identify and describe uses of various components of control systems (i.e., transistors, relays, HVAC, logic controllers).*
- *Discuss the importance of maintenance schedules.*

AG-PST 5.3 Use geospatial technologies in AFNR applications.

Sample Indicators:

- *Describe principles of global positioning, Geographical Information Systems (GIS), and remote sensing.*
- *List examples of geospatial technology applications in AFNR.*
- *Install and test geospatial technologies in AFNR applications.*