AGRISCIENCE TECHNOLOGY III

#01023

Description

Agriscience Technology courses integrate biological and technological concepts with principles of agriculture. Courses are designed in sequences to provide experiences in the subject matter. Units are selected to develop knowledge and skills pertaining to nutrition, reproduction, diseases, breeding, genetics, anatomy, and physiology in animals and plants. Genetic engineering, biotechnology, plant propagation techniques, agricultural production technologies, marketing technologies, aquaculture, animal health, and small animal care are examples of units that may be taught.

These courses integrate leadership and supervised agricultural experience programs. Career opportunities and educational preparation are examined. Learning activities are varied with classroom, laboratory and field experiences.

Note: These courses can be taught for Agricultural Education credit only.

Grade 9-12

½ or 1 credit

Max Credit = 1

Standard 1	AGRICULTURE, FOOD, & NATURAL RESOURCES (AFNR) CLUSTER SKILLS	
Topic 1.2	*Evaluate the nature and scope of the Agriculture, Food, & Natural Resources Career Cluster and the role of agriculture, food, and natural resources (AFNR) in society and the economy.*	
	Student Competencies	
1.2.2	**EXAMINE THE COMPONENTS OF THE AFNR SYSTEMS AND ASSESS THEIR IMPACT ON THE LOCAL, STATE, NATIONAL, AND GLOBAL SOCIETY AND ECONOMY.**	
	1.2.2.4	Assess components within AFNR systems and analyze relationships between systems.
	1.2.2.5	Assess how people within societies on local, state, national, and global levels interact with AFNR systems on daily, monthly, or yearly basis.
	1.2.2.6	Assess the economic impact of an AFNR system on a local, state, national, and global level.
	1.2.2.7	Devise and implement a strategy for explaining components of AFNR systems to audiences with limited knowledge.
Topic 1.3	*Examine and summarize the importance of health, safety, and environmental management systems in AFNR workplaces.*	
	Student Competencies	
1.3.1	**IDENTIFY AND EXPLAIN THE IMPLICATIONS OF REQUIRED REGULATIONS TO MAINTAIN AND IMPROVE SAFETY, HEALTH, AND ENVIRONMENTAL MANAGEMENT SYSTEMS.**	
	1.3.1.3	Execute health, safety, and environmental procedures to comply with regulatory and safety standards.
	1.3.1.4	Analyze existing required regulations within an AFNR workplace.
1.3.2	**DEVELOP AND IMPLEMENT A PLAN TO MAINTAIN AND IMPROVE HEALTH, SAFETY, AND ENVIRONMENTAL COMPLIANCE AND PERFORMANCE.**	
	1.3.2.4	Develop plans to improve environmental compliance and performance within an AFNR system.
	1.3.2.5	Create and implement a plan to improve safety, health, and environmental management regulations in an AFNR workplace.
1.3.3	**APPLY HEALTH AND SAFETY PRACTICES TO AFNR WORKPLACES.**	
	1.3.3.5	Analyze and evaluate the impact of current health and safety practices of AFNR workplaces.
	1.3.3.6	Assess various emergency response plan requirements for an AFNR workplaces and/or facility.
	1.3.3.7	Assess and apply first aid knowledge and procedures relevant to AFNR workplaces.
	1.3.3.8	Assess the safety priorities and select appropriate responses for different levels of contamination or injury at an AFNR workplace.

	1.3.4	USE APPROPRIATE PROTECTIVE EQUIPMENT AND DEMONSTRATE SAFE AND PROPER USE OF AFNR TOOLS AND EQUIPMENT.
	1.3.4.5	Complete the set up and adjustment for tools and equipment related to AFNR tasks.
	1.3.4.6	Assess and demonstrate appropriate operation, storage, and maintenance techniques for AFNR tools and equipment.
	1.3.4.7	Design and implement plans to ensure the use of appropriate protective equipment when using various AFNR tools and equipment.
Topic 1.5		*Describe career opportunities and means to achieve those opportunities in each of the Agriculture, Food, & Natural Resources career pathways.*
		Student Competencies
	1.5.1	EVALUATE AND IMPLEMENT THE STEPS AND REQUIREMENTS TO PURSUE A CAREER OPPORTUNITY IN EACH OF THE AFNR CAREER PATHWAYS (E.G., GOALS, DEGREES, CERTIFICATIONS, RESUMES, COVER LETTER, PORTFOLIOS, INTERVIEWS, ETC.).
	1.5.1.6	Assess personal goals, experiences, education, and skillsets and organize them to produce the appropriate tools and develop the skills to effectively communicate about one's qualifications for an AFNR career.
	1.5.1.7	Evaluate progress toward AFNR career goals and identify opportunities for improvement and necessary adjustments to one's plan of action.
	1.5.1.8	Implement one's personal plan of action for obtaining the required education, training, and experiences and evaluate progress to identify opportunities for improvement and necessary adjustments.
	1.5.1.9	Evaluate, update, and improve a set of personal tools to reflect current skills, experiences, education, goals, etc. and complete the processes needed to pursue and obtain a career in an AFNR pathway.
	1.5.2	EXAMINE AND CHOOSE CAREER OPPORTUNITIES THAT ARE MATCHED TO PERSONAL SKILLS, TALENTS, AND CAREER GOALS IN AN AFNR PATHWAY OF INTEREST.
	1.5.2.5	Interpret and evaluate the results of a personal career assessment and connect them to potential careers in AFNR pathways.
	1.5.2.6	Conduct interviews with career professionals within AFNR pathways and summarize the results.
Topic 1.6		*Analyze the interaction among AFNR systems in the production, processing, and management of food, fiber, and fuel and the sustainable use of natural resources.*
		Student Competencies
	1.6.1	EXAMINE AND EXPLAIN FOUNDATIONAL CYCLES AND SYSTEMS OF AFNR.
	1.6.1.5	Teach others about the impact of foundational cycles within AFNR systems.
	1.6.1.6	Evaluate AFNR systems and predict how the systems may change or adapt in the future of food, fiber, and fuel production based on current trends and data.

	1.6.2	**ANALYZE AND EXPLAIN THE CONNECTION AND RELATIONSHIPS BETWEEN DIFFERENT AFNR SYSTEMS ON A NATIONAL AND GLOBAL LEVEL.**
	1.6.2.5	Evaluate how AFNR systems impact each other on a national and global level.
	1.6.2.6	Evaluate how changes in one AFNR system can benefit cost components of other systems on a national and global level.

Standard 3	ANIMAL SYSTEMS	
Topic 3.3	*Design and provide proper animal nutrition to achieve desired outcomes for performance, development, reproduction, and/or economic production.*	
	Student Competencies	
3.3.2	**ANALYZE FEED RATIONS AND ASSESS IF THEY MEET THE NUTRITIONAL NEEDS OF ANIMALS.**	
	3.3.2.5	Appraise the adequacy of feed rations using data from the analysis of feedstuffs, animal requirements, and performance.
	3.3.2.6	Compare and contrast methods that utilize feed additives and growth promotants with production practices that do not (e.g., organic versus conventional production methods).
	3.3.2.7	Select appropriate feedstuffs for animals based on a variety of factors (e.g., economics, digestive system, and nutritional needs, etc.).
	3.3.2.8	Select and utilize animal feeds based on nutritional requirements, using rations for maximum nutrition and optimal economic production.
	3.3.2.9	Make and defend decisions regarding whether to use feed additives and growth promotants after researching and considering scientific evidence, production system needs and goals, and input from industry professionals.
3.3.3	**UTILIZE INDUSTRY TOOLS TO MAKE ANIMAL NUTRITION DECISIONS.**	
	3.3.3.5	Analyze and apply information from a feed label and feeding directions to feed animals.
	3.3.3.6	Analyze technologies used to provide animal nutrition and summarize their potential benefits and consequences.
	3.3.3.7	Select, evaluate, and defend the use of specific tools or equipment used to perform animal nutrition tasks.
	3.3.3.8	Evaluate and summarize the potential impacts, positive and negative, of compliance and/or noncompliance with a feed label and feeding directions.
	3.3.3.9	Research and recommend technology improvements to provide proper nutrition to animals.

Topic 3.4	*Apply principles of animal reproduction to achieve desired outcomes for performance, development, and/or economic production.*	
	Student Competencies	
3.4.1	**EVALUATE ANIMALS FOR BREEDING READINESS AND SOUNDNESS.**	
	3.4.1.5	Assess and describe factors that lead to reproductive maturity.
	3.4.1.6	Evaluate reproductive problems that occur in animals.
	3.4.1.7	Select breeding animals based on characteristics of the reproductive organs.
3.4.2	**APPLY SCIENTIFIC PRINCIPLES TO SELECT AND CARE FOR BREEDING ANIMALS.**	
	3.4.2.5	Compare and contrast the use of genetically superior animals in the production of animals and animal products.
	3.4.2.6	Demonstrate how to determine probability trait inheritance in animals.
	3.4.2.7	Analyze how DNA analysis can detect genetic defects in breeding stock.
	3.4.2.8	Analyze the care needs for breeding stock in each stage of growth.
	3.4.2.9	Select and evaluate a breeding system based on the principles of genetics.
	3.4.2.10	Select and evaluate breeding animals and determine the probability of a given trait in their offspring.
3.4.3	**APPLY SCIENTIFIC PRINCIPLES TO BREED ANIMALS.**	
	3.4.3.5	Calculate the potential economic benefits of natural versus artificial breeding methods.
	3.4.3.6	Demonstrate artificial insemination techniques.
	3.4.3.7	Analyze the processes of major reproductive management practices, including estrous synchronization, superovulation, flushing, and embryo transfer.
	3.4.3.8	Compare and contrast quantitative breeding value differences between genetically superior animals and animals of average genetic value.
	3.4.3.9	Select animal breeding methods based on reproductive and economic efficiency.
Topic 3.6	*Classify, evaluate, and select animals based on anatomical and physiological characteristics.*	
	Student Competencies	
3.6.2	**APPLY PRINCIPLES OF COMPARATIVE ANATOMY AND PHYSIOLOGY TO USES WITHIN VARIOUS ANIMAL SYSTEMS.**	
	3.6.2.5	Analyze the processes of meiosis and mitosis in animal growth, development, health, and reproduction.
	3.6.2.6	Compare and contrast animal cells, tissues, organs, body systems types, and functions among animal species.
	3.6.2.7	Correlate the functions of animal cell structures to animal growth, development, health, and reproduction.

Topic 3.7	*Apply principles of effective animal health care.*	
Student Competencies		
	3.7.1	**DESIGN PROGRAMS TO PREVENT ANIMAL DISEASES, PARASITES, AND OTHER DISORDERS AND ENSURE ANIMAL WELFARE.**
	3.7.1.5	Explain the clinical significance of common veterinary methods and treatment (e.g., aseptic techniques, antibiotic use, wound management, etc.).
	3.7.1.6	Describe and demonstrate the proper use and function of specific tools and technology related to animal health management.
	3.7.1.7	Perform simple health-check evaluations on animals and practice basic emergency response procedures related to animals.
	3.7.1.8	Identify and describe common illnesses and disorders of animals based on symptoms and problems caused by wounds, diseases, parasites, and physiological disorders.
	3.7.1.9	Research and analyze data to evaluate preventive measures for controlling and limiting the spread of diseases, parasites, and disorders among animals.
	3.7.2	**ANALYZE BIOSECURITY MEASURES UTILIZED TO PROTECT THE WELFARE OF ANIMALS ON A LOCAL, STATE, NATIONAL, AND GLOBAL LEVEL.**
	3.7.2.4	Analyze the health risk of different zoonotic diseases to humans and identify prevention methods.
	3.7.2.5	Design and evaluate a biosecurity plan for an animal production operation.

Standard 4	**BIOTECHNOLOGY SYSTEMS**	
Topic 4.1	*Assess factors that have influenced the evolution of biotechnology in agriculture (e.g., historical events, societal trends, ethical, and legal implications, etc.).*	
Student Competencies		
	4.1.1	**INVESTIGATE AND EXPLAIN THE RELATIONSHIP BETWEEN PAST, CURRENT AND EMERGING APPLICATIONS OF BIOTECHNOLOGY IN AGRICULTURE (E.G., MAJOR INNOVATORS, HISTORICAL DEVELOPMENTS, POTENTIAL APPLICATIONS OF BIOTECHNOLOGY, ETC.).**
	4.1.1.9	Evaluate and explain how scientists use the scientific method to build upon previous findings in current and emerging research.
	4.1.1.10	Evaluate the outcomes and impacts of biotechnology on the globalization of agriculture.

4.1.2	**EVALUATE THE SCOPE AND IMPLICATIONS OF REGULATORY AGENCIES ON APPLICATIONS OF BIOTECHNOLOGY IN AGRICULTURE AND PROTECTION OF PUBLIC INTERESTS (E.G., HEALTH, SAFETY, ENVIRONMENTAL ISSUES, ETC.).**	
	4.1.2.4	Assess and summarize the role and scope of agencies that regulate biotechnology.
	4.1.2.5	Analyze the impact major regulatory issues have on public acceptance of biotechnology in agriculture.
4.1.3	**ANALYZE THE RELATIONSHIP AND IMPLICATIONS OF BIOETHICS, LAWS, AND PUBLIC PERCEPTIONS ON APPLICATIONS OF BIOTECHNOLOGY IN AGRICULTURE (E.G., ETHICAL, LEGAL, SOCIAL, CULTURAL ISSUES).**	
	4.1.3.5	Determine the significance and impacts of legal issues related to biotechnology in agriculture.
	4.1.3.6	Analyze the impact of public perceptions on the application of biotechnology in different AFNR systems.
	4.1.3.7	Devise and support an argument for or against an ethical issue associated with biotechnology in agriculture.
	4.1.3.8	Propose a solution for a legal issue associated with biotechnology in agriculture.
Topic 4.2	*Demonstrate proficiency by safely applying appropriate laboratory skills to complete tasks in a biotechnology research and development environment (e.g., standard operating procedures, record keeping, aseptic technique, equipment maintenance, etc.).*	
Student Competencies		
4.2.1	**READ, DOCUMENT, EVALUATE, AND SECURE ACCURATE LABORATORY RECORDS OF EXPERIMENTAL PROTOCOLS, OBSERVATIONS, AND RESULTS.**	
	4.2.1.5	Assess when security procedures for data and information collected in a laboratory should be implemented.
	4.2.1.6	Analyze and document the security procedures for data collected using bioinformatics.
	4.2.1.7	Evaluate the strengths and weaknesses of using research documentation and propose improvements to ensure study reproduction and utility in future studies.
Topic 4.3	*Demonstrate the application of biotechnology to solve problems in Agriculture, Food, and Natural Resources (AFNR) systems (e.g., bioengineering, food processing, waste management, horticulture, forestry, livestock, crops, etc.).*	
Student Competencies		
4.3.1	**APPLY BIOTECHNOLOGY PRINCIPLES, TECHNIQUES, AND PROCESSES TO CREATE TRANSGENIC SPECIES THROUGH GENETIC ENGINEERING.**	
	4.3.1.5	Analyze and document the processes and describe the techniques used to produce transgenic eukaryotes (e.g., microbial synthetic biology, gene knockout therapy, traditional gene insertion, etc.).
	4.3.1.6	Assess and argue the pros and cons of transgenic species in agriculture.
	4.3.1.7	Research and evaluate genetic engineering procedures used in the production of living species.
	4.3.1.8	Analyze data to identify changes and patterns of transgenic species in the environment.

	4.3.2	**APPLY BIOTECHNOLOGY PRINCIPLES, TECHNIQUES, AND PROCESSES TO ENHANCE THE PRODUCTION OF FOOD THROUGH THE USE OF MICROORGANISMS AND ENZYMES.**
	4.3.2.5	Analyze processes by which enzymes are produced through biotechnology.
	4.3.2.6	Compare and contrast the effectiveness, purpose, and outcomes associated with biotechnology as well as conventional processes used in food processing.
	4.3.3	**APPLY BIOTECHNOLOGY PRINCIPLES, TECHNIQUES, AND PROCESSES TO PROTECT THE ENVIRONMENT AND MAXIMIZE USE OF NATURAL RESOURCES (E.G., BIOMASS, BIOPROSPECTING, INDUSTRIAL BIOTECHNOLOGY, ETC.).**
	4.3.3.5	Apply the processes used in the production of molecules for use in industrial applications.
	4.3.3.6	Assess and document the pros and cons of bioprospecting to achieve a research or product development objective.
	4.3.3.7	Evaluate the impact of modified organisms on the natural environment.
	4.3.5	**APPLY BIOTECHNOLOGY PRINCIPLES, TECHNIQUES, AND PROCESSES TO PRODUCE BIOFUELS (E.G., FERMENTATION, TRANSESTERIFICATION, METHANOGENESIS, ETC.).**
	4.3.5.5	Examine the process of methanogenesis and its potential applications.
	4.3.5.6	Analyze the impact of the production and use of biofuels on the environment.
	4.3.5.7	Assess the characteristics of biomass that make it useful for biofuels production.
	4.3.5.8	Correlate the relationship between fermentation and the process used to produce alcohol from biomass.
	4.3.6	**APPLY BIOTECHNOLOGY PRINCIPLES, TECHNIQUES, AND PROCESSES TO IMPROVE WASTE MANAGEMENT (E.G., GENETICALLY MODIFIED ORGANISMS, BIOREMEDIATION, ETC.).**
	4.3.6.5	Analyze the process by which organisms are genetically engineered for waste treatment.
	4.3.6.6	Assess and describe the processes involved in biotreatment of biological wastes.
	4.3.6.7	Evaluate and describe the processes involved in biotreatment of industrial chemical wastes.
	4.3.6.8	Analyze and summarize the risks and benefits of using biotechnology for bioremediation.

Standard 5	**ENVIRONMENTAL SERVICE SYSTEMS**	
Topic 5.4	*Demonstrate the operation of environmental service systems (e.g., pollution control, water treatment, wastewater treatment, solid waste management, and energy conservation).*	
	Student Competencies	
	5.4.4	**COMPARE AND CONTRAST THE IMPACT OF CONVENTIONAL AND ALTERNATIVE ENERGY SOURCES ON THE ENVIRONMENT AND OPERATION OF ENVIRONMENTAL SERVICE SYSTEMS.**
	5.4.4.1	Research conventional energy sources and list conservation measures to reduce the impact on environmental service systems.

	5.4.4.2	Research alternative energy sources and describe the motivations for seeking alternatives to conventional energy sources as they relate to environmental monitoring.	
	5.4.4.3	Examine the factors that affect energy consumption and describe how these factors are related to environmental monitoring.	
	5.4.4.4	Research the impact on environmental service systems that occur because of energy consumption.	
	5.4.4.5	Examine and explain how energy consumption and the carbon cycle relate to environmental monitoring.	
	5.4.4.6	Research and describe the purpose and applications of life cycle assessments to environmental service systems.	
	5.4.4.7	Assess the advantages and disadvantages of conventional energy sources in regards to environmental service systems.	
	5.4.4.8	Identify advantages and disadvantages of alternative energy sources as they pertain to environmental service systems.	
	5.4.4.9	Analyze and document the main categories of energy consumption.	
	5.4.4.10	Analyze and document the most significant impacts that energy consumption has on environmental monitoring.	
	5.4.4.11	Calculate the impact of the carbon cycle imbalance (due to energy consumption) and assess how this imbalance affects environmental service systems.	
	5.4.4.12	Interpret a life cycle assessment and explain how it can be utilized in environmental service systems to assess the potential ecological impact of an energy source.	
	5.4.4.13	Evaluate the impact burning of fossil fuels has on environmental service systems.	
	5.4.4.14	Evaluate the impact alternative energy sources have on environmental conditions.	
	5.4.4.15	Evaluate strategies for reducing energy consumption to determine the most effective course of action based on the needs of environmental service systems.	
	5.4.4.16	Devise a strategy for improving future energy consumption in a manner consistent with the intents of environmental service systems.	
Topic 5.5	*Use tools, equipment, machinery, & technology common to tasks in environmental service systems.*		
Student Competencies			
	5.5.1	**USE TECHNOLOGICAL AND MATHEMATICAL TOOLS TO MAP LAND, FACILITIES AND INFRASTRUCTURE FOR ENVIRONMENTAL SERVICE SYSTEMS.**	
	5.5.1.1	Examine the importance and describe applications of surveying and mapping for environmental service systems.	
	5.5.1.2	Research the methods in which GIS can be used in environmental service systems (e.g., tracing of point pollution, control of the spread of invasive species, etc.).	
	5.5.1.3	Research how advancements in technology (e.g., unmanned aerial vehicles and drones, genetic modification, fracking, alternative energy, etc.) have changed environmental service systems.	

	5.5.1.4	Apply surveying and mapping principles to a situation involving environmental service systems and identify and explain the use of equipment for surveying and mapping.
	5.5.1.5	Apply GIS skills to a situation specific to environmental service systems.
	5.5.1.6	Analyze and document examples of utilization of breaking technology in environmental service systems.

Standard 6	FOOD PRODUCTS AND PROCESSING SYSTEMS	
Topic 6.3	*Select and process food products for storage, distribution, and consumption.*	
	Student Competencies	
6.3.1	**IMPLEMENT SELECTION, EVALUATION AND INSPECTION TECHNIQUES TO ENSURE SAFE AND QUALITY FOOD PRODUCTS.**	
	6.3.1.1	Summarize characteristics of quality and yield grades of food products.
	6.3.1.2	Summarize procedures to select raw food products based on yield grades and quality grades.
	6.3.1.3	Identify and describe protocols for inspection and harvesting techniques for animal food products (e.g., pre-mortem and post-mortem inspections, Food Safety Inspection Service guidelines (FSIS), etc.).
	6.3.1.4	Identify and describe foods derived from different classifications of food products (e.g., meat, egg, poultry, fish, dairy, fruits, vegetables, grains, legumes, oilseeds, etc.).
	6.3.1.5	Analyze factors that affect quality and yield grades of food products.
	6.3.1.6	Assemble procedures to perform quality-control inspections of raw food products for processing.
	6.3.1.7	Examine and evaluate inspection and harvesting of animals using regulatory agency approved or industry-approved techniques.
	6.3.1.8	Examine and summarize desirable qualities of food products derived from different classifications of food products.
	6.3.1.9	Outline procedures to assign quality and yield grades to food products according to industry standards.

	6.3.2	**DESIGN AND APPLY TECHNIQUES OF FOOD PROCESSING, PRESERVATION, PACKAGING, AND PRESENTATION FOR DISTRIBUTION AND CONSUMPTION OF FOOD PRODUCTS.**	
		6.3.2.5	Compare weights and measurements of products and perform conversions between units of measure.
		6.3.2.6	Outline appropriate methods and prepare foods for sale and distribution for different markets.
		6.3.2.7	Analyze and document food preservation processes and methods on a variety of food products.
		6.3.2.8	Analyze the degree of desirable food qualities of foods stored in various packaging.
		6.3.2.9	Design plans to formulate and package food products using a variety of weights and measures.
		6.3.2.10	Evaluate food quality factors on foods prepared for different markets (e.g., shelf life, shrinkage, appearance, weight, etc.).
	6.3.3	**CREATE FOOD DISTRIBUTION PLANS AND PROCEDURES TO ENSURE SAFE DELIVERY OF FOOD PRODUCTS.**	
		6.3.3.3	Research and summarize different types of market demands for food products (e.g., local food, organic, non-GMO, etc.).
		6.3.3.4	Research and document ways to reduce environmental impact from food distribution activities.
		6.3.3.5	Interpret safety procedures used in food distribution to ensure a safe product is being delivered to consumers.
		6.3.3.6	Assess and explain how market demand for food products influences the distribution of food products.
		6.3.3.7	Devise and defend a strategy to determine ways for food distribution to reduce environmental impacts.
Topic 6.4		*Explain the scope of the food industry and the historical and current developments of food product and processing.*	
		Student Competencies	
	6.4.1	**EXAMINE THE SCOPE OF THE FOOD INDUSTRY BY EVALUATING LOCAL AND GLOBAL POLICIES, TRENDS, AND CUSTOMS FOR FOOD PRODUCTION.**	
		6.4.1.3	Compare and contrast cultural differences regarding food products and processing practices.
		6.4.1.4	Analyze the similarities and differences amongst policies and legislation that affect the food products and processing system in the U.S. or around the world.
		6.4.1.5	Construct and implement methods to obtain data on food consumer trends in a specific market.
		6.4.1.6	Analyze food production and distribution outcomes based on cultural customs.
		6.4.1.7	Articulate and defend a personal point of view on policies and legislation that affect the food products and processing system in the U.S. or around the world.
	6.4.2	**EVALUATE THE SIGNIFICANCE AND IMPLICATIONS OF CHANGES AND TRENDS IN THE FOOD PRODUCTS AND PROCESSING INDUSTRY IN THE LOCAL AND GLOBAL FOOD SYSTEMS.**	
		6.4.2.3	Research and describe current and emerging technologies related to food products and processing (e.g., high pressure processing of foods, automation, biotechnology, etc.).
		6.4.2.4	Analyze & document significant changes & trends in the food products/processing industry.

	6.4.2.5	Research & summarize current issues related to the safety and environmental concerns about foods and food processing (e.g., GMOs, irradiation, microorganisms, contamination, etc.).
6.4.3		**IDENTIFY AND EXPLAIN THE PURPOSE OF INDUSTRY ORGANIZATIONS, GROUPS, AND REGULATORY AGENCIES THAT INFLUENCE THE LOCAL AND GLOBAL FOOD SYSTEMS.**
	6.4.3.3	Evaluate the changes in the food products and processing industry brought about by industry organizations or regulatory agencies.
	6.4.3.4	Assess and summarize the application of industry standards in the food products and processing industry.

Standard 7	**NATURAL RESOURCE SYSTEMS**	
Topic 7.2	*Analyze the interrelationships between natural resources and humans.*	
	Student Competencies	
7.2.4	**EXAMINE AND EXPLAIN HOW ECONOMICS AFFECTS THE USE OF NATURAL RESOURCES.**	
	7.2.4.1	Compare and contrast how the economic value of a natural resource affects its availability.
	7.2.4.2	Research the impact of the use of natural resources on local, state and national economies (e.g., outdoor recreation, energy production, preservation, etc.).
	7.2.4.3	Compare and contrast the economic impact of green technology and alternative energy.
	7.2.4.4	Assess whether economic value increases or decreases the conservation, protection, improvement, and enhancement of natural resources.
	7.2.4.5	Assess the importance of the use of natural resources on local, state, and national economies.
7.3.2	**DEMONSTRATE CARTOGRAPHIC SKILLS, TOOLS, AND TECHNOLOGIES TO AID IN DEVELOPING, IMPLEMENTING, AND EVALUATING NATURAL RESOURCE MANAGEMENT PLANS.**	
	7.3.2.1	Summarize how to use maps and technologies to identify directions and land features, calculate actual distance, and determine the elevations of points.
	7.3.2.2	Summarize how GIS can be used to manage, conserve, improve, and enhance the natural resources of an area.
	7.3.2.3	Apply cartographic skills and tools and technologies (e.g., land surveys, geographic coordinate systems, etc.) to locate natural resources.
	7.3.2.4	Analyze an area's resources using GIS technologies.

Standard 8	PLANT SYSTEMS	
Topic 8.4	*Apply principles of design in plant systems to enhance an environment (e.g. floral, forest landscape, and farm).*	
	Student Competencies	
8.4.1	**EVALUATING, IDENTIFYING, AND PREPARING PLANTS TO ENHANCE AN ENVIRONMENT.**	
	8.4.1.1	Identify and categorize plants by their purpose (e.g., floral plants, landscape plants, house plants, etc.).
	8.4.1.2	Summarize the applications of design in agriculture and ornamental plant systems.
	8.4.1.3	Demonstrate proper use of plants in their environment (e.g., focal and filler plants in floriculture, heat tolerant and shade plants in a landscape design, etc.).
	8.4.1.4	Create a design utilizing plants in their proper environments.
	8.4.1.5	Install plants according to a design plan that uses the proper plants based on the situation and environment.
	8.4.1.6	Evaluate a design and provide feedback and suggestions for improvement (e.g., a floral arrangement, a landscape or a landscape plan, etc.).
8.4.2	**CREATE DESIGNS USING PLANTS.**	
	8.4.2.1	Research and summarize the principles and elements of design for use in plant systems.
	8.4.2.2	Identify and categorize tools used for design (e.g., computer landscape software, drawing tools, florist tools, etc.).
	8.4.2.3	Explain the concept of landscape ecology and summarize factors that shape the ecology of a landscape (e.g., composition, structure, function, etc.).
	8.4.2.4	Apply principles and elements of design that form the basis of artistic impression.
	8.4.2.5	Demonstrate the use of tools used for creating designs.
	8.4.2.6	Research and provide examples of ecological factors incorporated into landscape designs.
	8.4.2.7	Analyze designs to identify use of design principles and elements.

Career Ready Practices (CRP)

FFA & SUPERVISED AGRICULTURAL EXPERIENCE

CRP 1	**Act as a responsible and contributing citizen and employee.**
CRP 2	**Apply appropriate academic and technical skills.**
CRP 3	**Attend to personal health and financial well-being.**
CRP 4	**Communicate clearly, effectively, and with reason.**
CRP 5	**Consider the environmental, social, and economic impacts of decisions.**
CRP 6	**Demonstrate creativity and innovation.**
CRP 7	**Employ valid and reliable research strategies.**
CRP 8	**Utilize critical thinking to make sense of problems and persevere in solving them.**
CRP 9	**Model integrity, ethical leadership, and effective management.**
CRP 10	**Plan education and career path aligned to personal goals.**
CRP 11	**Use technology to enhance productivity.**
CRP 12	**Work productively in teams while using cultural/global competence.**