



# AGRICULTURAL PROCESSING

#01068

## Description

This course is designed to introduce students to the processing of agricultural products. The course will include the processing of food, fiber, and material product processing for the global economy will be emphasized. Personal communication skills, human relation skills, leadership development skills, and supervised agricultural experiences will be emphasized.

Grade 10-12

½ or 1 credit

Max Credit = 1

<b>Standard 1</b>	<b>AGRICULTURE, FOOD, &amp; NATURAL RESOURCES (AFNR) CLUSTER SKILLS</b>	
<b>Topic 1.1</b>	<i>Analyze how issues, trends, technologies, and public policies impact systems in the Agriculture, Food, &amp; Natural Resources Career Cluster.</i>	
	<b>Student Competencies</b>	
	<b>1.1.1</b>	<b>RESEARCH, EXAMINE, AND DISCUSS ISSUES AND TRENDS THAT IMPACT AFNR SYSTEMS ON LOCAL, STATE, NATIONAL, AND GLOBAL LEVELS.</b>
	1.1.1.1	Examine historical and current data to identify issues impacting AFNR systems.
	1.1.1.2	Research and summarize trends impacting AFNR systems.
	1.1.1.3	Analyze and summarize AFNR issues and their impact on local, state, national, and global levels.
	1.1.1.4	Analyze current trends in AFNR systems and predict their impact on local, state, national, and global levels.
	1.1.1.5	Evaluate and explain AFNR issues and their impacts to audiences with limited AFNR knowledge.
	1.1.1.6	Evaluate and explain emerging trends and the opportunities they may create within the AFNR systems.
	<b>1.1.2</b>	<b>EXAMINE TECHNOLOGIES AND ANALYZE THEIR IMPACT ON AFNR SYSTEMS.</b>
	1.1.2.1	Research technologies used in AFNR systems.
	1.1.2.2	Compare and contrast AFNR systems before and after the integration of technology.
	1.1.2.3	Apply appropriate use of technologies in AFNR workplace scenarios.
	1.1.2.4	Analyze how technology is used in AFNR systems to maximize productivity.
	1.1.2.5	Solve problems in AFNR workplaces or scenarios using technology.
	1.1.2.6	Evaluate the importance of technology use and how it impacts AFNR systems.
	<b>1.1.3</b>	<b>IDENTIFY PUBLIC POLICIES AND EXAMINE THEIR IMPACT ON AFNR SYSTEMS.</b>
	1.1.3.1	Summarize public policies affecting AFNR systems.
	1.1.3.2	Identify influential historical and current public policies that impact AFNR systems.
	1.1.3.3	Analyze and assess at least two public policies that impact each AFNR system.
	1.1.3.4	Create and propose a hypothetical policy that will impact current AFNR systems.
	1.1.3.5	Evaluate a public policy within AFNR systems and defend or challenge it.
	1.1.3.6	Create a plan for implementing a new public policy that will positively impact AFNR systems.
<b>Topic 1.2</b>	<i>Evaluate the nature and scope of the Agriculture, Food, &amp; Natural Resources Career Cluster and the role of agriculture, food, and natural resources (AFNR) in society and the economy.</i>	
	<b>Student Competencies</b>	
	<b>1.2.1</b>	<b>RESEARCH AND USE GEOGRAPHIC AND ECONOMIC DATA TO SOLVE PROBLEMS IN AFNR SYSTEMS.</b>
	1.2.1.1	Research and describe different types of geographic data used in AFNR systems.

		1.2.1.2	Identify and examine economic data related to AFNR systems (e.g., commodity markets, food marketing, food, and nutritional assistance programs, etc.).
		1.2.1.3	Analyze and interpret AFNR related geographic data using a variety of systems and technologies (e.g., GIS, GPS, etc.).
		1.2.1.4	Analyze and interpret a set of economic data and explain how it impacts an AFNR system.
		1.2.1.5	Evaluate geographic data and select necessary data sets to solve problems within AFNR systems.
		1.2.1.6	Devise a strategy to solve a problem in an AFNR system using a set of economic data.
	1.2.2	<b>EXAMINE THE COMPONENTS OF THE AFNR SYSTEMS AND ASSESS THEIR IMPACT ON THE LOCAL, STATE, NATIONAL, AND GLOBAL SOCIETY AND ECONOMY.</b>	
		1.2.2.1	Identify and summarize the components within AFNR systems (e.g., Animal Systems: health, nutrition, genetics, etc.; Natural Resources Systems: soil, water, etc.).
		1.2.2.2	Define and summarize societies on local, state, national, and global levels and describe how they relate to AFNR systems.
		1.2.2.3	Examine and summarize the components of the agricultural economy (e.g., environmental, crops, livestock, etc.).
		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.
		1.2.2.8	Evaluate how society traditions, customs, or policies have resulted from practices with AFNR systems.
		1.2.2.9	Evaluate how positive or negative changes in the local, state, national, or global economy impacts AFNR systems.
<b>Topic 1.3</b>	<b><i>Examine and summarize the importance of health, safety, and environmental management systems in AFNR workplaces.</i></b>		
<b>Student Competencies</b>			
	1.3.1	<b>IDENTIFY AND EXPLAIN THE IMPLICATIONS OF REQUIRED REGULATIONS TO MAINTAIN AND IMPROVE SAFETY, HEALTH, AND ENVIRONMENTAL MANAGEMENT SYSTEMS.</b>	
		1.3.1.1	Research and explain the implications of regulatory, safety, and health standards on AFNR systems (e.g., SDS, bioterrorism, etc.)
		1.3.1.2	Summarize the importance of safety, health, and environmental management in the workplace.
		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.

	1.3.1.5	Evaluate how AFNR organizations/businesses promote improved health, safety, and environmental management and determine steps to maintain compliance with regulatory and safety standards in AFNR situations.
	1.3.1.6	Construct and implement methods to evaluate compliance with required safety, health, and environmental management regulations.
	1.3.2	<b>DEVELOP AND IMPLEMENT A PLAN TO MAINTAIN AND IMPROVE HEALTH, SAFETY, AND ENVIRONMENTAL COMPLIANCE AND PERFORMANCE.</b>
	1.3.2.1	Research and identify components required in health and safety performance plans.
	1.3.2.2	Examine and categorize examples of environmental compliance plans from AFNR workplace.
	1.3.2.3	Analyze the effectiveness of health and safety performance plans of an AFNR workplace.
	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.
	1.3.2.6	Devise and implement a strategy to educate employees on environmental compliance and performance in an AFNR workplace.
	1.3.3	<b>APPLY HEALTH AND SAFETY PRACTICES TO AFNR WORKPLACES.</b>
	1.3.3.1	Research and summarize the purposes and objectives of health and safety policies and procedures relevant to AFNR careers.
	1.3.3.2	Identify emergency response procedures for health and safety issues at AFNR workplaces.
	1.3.3.3	Examine and categorize examples of how to avoid health or safety risks in AFNR workplaces.
	1.3.3.4	Examine and categorize the risk level of contamination or injury as associated with AFNR tasks in the workplace.
	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.
	1.3.3.9	Create and implement a health and safety policy plan for AFNR workplaces.
	1.3.3.10	Create and implement a plan to communicate appropriate responses for health and safety situations within an AFNR workplace.
	1.3.3.11	Conduct a survey and evaluate results of AFNR workplaces to identify structure of health and safety practices and number of employees certified in first aid training.
	1.3.3.12	Create a plan to mitigate the level of contamination or injury identified as a risk in the workplace.
	1.3.4	<b>USE APPROPRIATE PROTECTIVE EQUIPMENT AND DEMONSTRATE SAFE AND PROPER USE OF AFNR TOOLS AND EQUIPMENT.</b>
	1.3.4.1	Identify and differentiate the appropriate protective equipment for the safe use and operation of specific tools and equipment (e.g. PPE, etc.).

	1.3.4.2	Identify standard tools, equipment and safety procedures related to AFNR tasks.
	1.3.4.3	Read and interpret operating instructions related to operation, storage and maintenance of tools and equipment related AFNR tasks.
	1.3.4.4	Analyze and demonstrate adherence to protective equipment requirements when using various 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.
	1.3.4.8	Evaluate and select appropriate tools and equipment to complete AFNR tasks.
	1.3.4.9	Devise and implement operation, storage, and maintenance plans or schedules for AFNR tools and equipment.
<b>Topic 1.4</b>	<b><i>Demonstrate stewardship of natural resources in AFNR activities.</i></b>	
<b>Student Competencies</b>		
	1.4.1	<b>IDENTIFY AND IMPLEMENT PRACTICES TO STEWARD NATURAL RESOURCES IN DIFFERENT AFNR SYSTEMS.</b>
	1.4.1.1	Define stewardship of natural resources and distinguish how it connects to AFNR systems.
	1.4.1.2	Read and interpret the definition of sustainability and summarize how it relates to AFNR activities.
	1.4.1.3	Analyze available practices to steward natural resources in AFNR systems (e.g., wildlife and land conservation, soil and water practices, ecosystem management, etc.).
	1.4.1.4	Analyze and assess sustainability practices that can be applied in AFNR systems (e.g., energy efficiency, recycle/reuse/repurpose, green resources, etc.).
	1.4.1.5	Devise strategies for stewarding natural resources at home and within community.
	1.4.1.6	Evaluate sustainability policies and plans and prepare summary of potential improvements for AFNR businesses or organizations.
	1.4.2	<b>ASSESS AND EXPLAIN THE NATURAL RESOURCE RELATED TRENDS, TECHNOLOGIES, AND POLICIES THAT IMPACT AFNR SYSTEMS.</b>
	1.4.2.1	Research and examine historical and current natural resources trends and technologies.
	1.4.2.2	Research and summarize influential historical and current natural resources policies that impact AFNR systems.
	1.4.2.3	Analyze natural resources trends and technologies and explain how they impact AFNR systems (e.g., climate change, green technologies, water resources, etc.).
	1.4.2.4	Create and defend a hypothetical natural resources policy that will impact current AFNR systems (e.g., for water resources, land use, air quality, etc.).
	1.4.2.5	Defend or challenge natural resources trends and technologies based upon an assessment of their impact on AFNR systems.

	1.4.2.6	Design and implement strategies for implementing a new natural resources policy that will positively impact AFNR systems.
<b>Topic 1.5</b>	<b><i>Describe career opportunities and means to achieve those opportunities in each of the Agriculture, Food, &amp; Natural Resources career pathways.</i></b>	
	<b>Student Competencies</b>	
	1.5.1	<b>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.).</b>
	1.5.1.1	Identify and summarize the steps to pursue a career in an AFNR pathway (e.g., self-assessment, set goals, etc.).
	1.5.1.2	Examine the educational, training, and experiential requirements to pursue a career in an AFNR pathway (e.g., degrees, certifications, training, internships, etc.).
	1.5.1.3	Research and summarize specific tools (e.g., resumes, portfolios, cover letters, etc.) and processes (e.g., interviews, applications, etc.) needed to pursue a career in an AFNR pathway.
	1.5.1.4	Create a personal plan outlining goals and steps to obtain a career in an AFNR pathway.
	1.5.1.5	Analyze personal skillset and create a plan for obtaining the required education, training, and experiences to obtain a career in an AFNR pathway.
	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	<b>EXAMINE AND CHOOSE CAREER OPPORTUNITIES THAT ARE MATCHED TO PERSONAL SKILLS, TALENTS, AND CAREER GOALS IN AN AFNR PATHWAY OF INTEREST.</b>
	1.5.2.1	Examine and categorize careers in each of the AFNR pathways.
	1.5.2.2	Research and describe careers in each of the AFNR pathways and choose potential careers connecting to personal interests and skills.
	1.5.2.3	Assess personal skills and align them with potential career opportunities in AFNR pathways.
	1.5.2.4	Assemble and analyze examples of careers and related statistics on a local, state, national, and global level.

	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.
<b>Topic 1.6</b>	<b><i>Analyze the interaction among AFNR systems in the production, processing, and management of food, fiber, and fuel and the sustainable use of natural resources.</i></b>	
	<b>Student Competencies</b>	
	1.6.1	<b>EXAMINE AND EXPLAIN FOUNDATIONAL CYCLES AND SYSTEMS OF AFNR.</b>
	1.6.1.1	Research and explain the foundational cycles in AFNR (e.g., water cycle, nutrient cycle, carbon cycle, etc.).
	1.6.1.2	Examine and describe examples of systems within AFNR (e.g., sustainability, gate-to-plate, etc.).
	1.6.1.3	Analyze and explain how foundational cycles affect production, processing, and management of food, fiber, and fuel.
	1.6.1.4	Analyze AFNR systems and determine their impact on producing and processing food, fiber, and fuel.
	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	<b>ANALYZE AND EXPLAIN THE CONNECTION AND RELATIONSHIPS BETWEEN DIFFERENT AFNR SYSTEMS ON A NATIONAL AND GLOBAL LEVEL.</b>
	1.6.2.1	Summarize how AFNR systems connect and relate on a national and global level (e.g., soil, water, economic, etc.).
	1.6.2.2	Examine and summarize changes that happen in AFNR systems on a national and global level (e.g., using less irrigation water, reduction of inputs, etc.).
	1.6.2.3	Analyze differences between AFNR systems on a national and global scale.
	1.6.2.4	Analyze the connections and relationships impacted when there is a change in an AFNR system 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.

<b>Standard 3</b>	<b>ANIMAL SYSTEMS</b>	
<b>Topic 3.2</b>	<i>Utilize best-practice protocols based upon animal behaviors for animal husbandry and welfare.</i>	
<b>Student Competencies</b>		
	<b>3.2.2</b>	<b>ANALYZE PROCEDURES TO ENSURE THAT ANIMAL PRODUCTS ARE SAFE FOR CONSUMPTION (E.G., USE IN FOOD SYSTEM, ETC.).</b>
	3.2.2.1	Identify and categorize tools, technology and equipment used in animal husbandry and welfare to help provide an abundant and safe food supply.
	3.2.2.2	Research and summarize animal production practices that may pose health risks.
	3.2.2.3	Identify and describe animal tracking systems used in animal systems (e.g., livestock, companion animal, exotics, etc.).
	3.2.2.4	Utilize tools, technology, and equipment to perform animal husbandry and welfare tasks.
	3.2.2.5	Analyze consumer concerns with animal production practices relative to human health.
	3.2.2.6	Analyze and summarize the impact of animal trace-back capabilities on producers and consumers.
	3.2.2.7	Select, evaluate and defend the use of specific tools, technology, or equipment used to perform animal husbandry and welfare tasks.
	3.2.2.8	Research and evaluate programs to assure the safety of animal products for consumption.
	3.2.2.9	Evaluate the effectiveness of animal and/or premise identification programs for a given species.
<b>Topic 3.6</b>	<i>Classify, evaluate, and select animals based on anatomical and physiological characteristics.</i>	
<b>Student Competencies</b>		
	<b>3.6.3</b>	<b>SELECT AND TRAIN ANIMALS FOR SPECIFIC PURPOSES AND MAXIMUM PERFORMANCE BASED ON ANATOMY AND PHYSIOLOGY.</b>
	3.6.3.1	Identify and summarize how an animal’s health can be affected by anatomical and physiological disorders.
	3.6.3.2	Evaluate an animal against its optimal anatomical and physiological characteristics.
	3.6.3.3	Research and summarize the use of products and by-products derived from animals.
	3.6.3.4	Compare and contrast desirable anatomical and physiological characteristics of animals within and between species.
	3.6.3.5	Compare and contrast procedures to sustainably and efficiently develop an animal to reach its highest performance potential with respect to its anatomical and physiological characteristics.
	3.6.3.6	Evaluate and select products from animals based on industry standards.
	3.6.3.7	Evaluate and select animals to maximize performance based on anatomical and physiological characteristics that affect health, growth, and reproduction.



	3.6.3.8	Choose, implement, and evaluate sustainable and efficient procedures (e.g., selection, housing, nutrition, and management) to produce consistently high-quality animals that are well suited for their intended purposes.
	3.6.3.9	Evaluate and select animals to produce superior animal products based on industry standards.
<b>Standard 4</b>	<b>BIOTECHNOLOGY SYSTEMS</b>	
<b>Topic 4.3</b>	<i>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.).</i>	
	<b>Student Competencies</b>	
	4.3.1	<b>APPLY BIOTECHNOLOGY PRINCIPLES, TECHNIQUES, AND PROCESSES TO CREATE TRANSGENIC SPECIES THROUGH GENETIC ENGINEERING.</b>
	4.3.1.1	Summarize biological, social, agronomic, and economic reasons for genetic modification of eukaryotes.
	4.3.1.2	Summarize the process of transformation of eukaryotic cells with transgenic DNA.
	4.3.1.3	Analyze the benefits and risks associated with the use of biotechnology to increase productivity and improve quality of living species (e.g., plants, animals such as aquatic species, etc.).
	4.3.1.4	Define and summarize epigenetics and synthesize the relationship between mutation, migration, and evolution of transgenes in the environment.
	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	<b>APPLY BIOTECHNOLOGY PRINCIPLES, TECHNIQUES, AND PROCESSES TO ENHANCE THE PRODUCTION OF FOOD THROUGH THE USE OF MICROORGANISMS AND ENZYMES.</b>
	4.3.2.1	Summarize reasons for detecting microbes and identify sources of microbes.
	4.3.2.2	Examine enzymes, the changes they cause and the physical and chemical parameters that affect enzymatic reactions (e.g., food, cellulosic bioenergy, etc.).
	4.3.2.3	Identify and categorize foods produced through the use of biotechnology (e.g., fermentation, etc.) to change the chemical properties of food for an intended purpose (e.g., create desirable nutritional profile, preservation, flavor, etc.).
	4.3.2.4	Assess and describe the use of biotechnology to detect microbes.
	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.
	4.3.2.7	Design and perform an assay to detect a target microorganism in food, water, or the environment.
	4.3.2.8	Conduct studies using scientific techniques to improve or discover enzymes for use in biotechnology (e.g., microbial strain selection).
	4.3.2.9	Process food using biotechnology to achieve an intended purpose (e.g., preservation, flavor enhancement, etc.).
	<b>4.3.5</b>	<b>APPLY BIOTECHNOLOGY PRINCIPLES, TECHNIQUES, AND PROCESSES TO PRODUCE BIOFUELS (E.G., FERMENTATION, TRANSESTERIFICATION, METHANOGENESIS, ETC.).</b>
	4.3.5.1	Examine and synthesize the need for biofuels (e.g., cellulosic bioenergy, etc.).
	4.3.5.2	Differentiate between biomass and sources of biomass.
	4.3.5.3	Research and explain the process of fermentation and its potential applications.
	4.3.5.4	Define and summarize the process of transesterification and its potential applications.
	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.
	4.3.5.9	Analyze and document the process used to produce biodiesel from biomass.
	4.3.5.10	Analyze and describe the process used to produce methane from biomass.
	4.3.5.11	Evaluate and support how biofuels could solve a global issue (e.g., environmental, agricultural, etc.).
	4.3.5.12	Conduct a review of the technologies used to create biofuels from biomass and weigh the pros and cons of each method.
	4.3.5.13	Produce alcohol and co-products from biomass.
	4.3.5.14	Produce biodiesel and co-products from biomass.
	4.3.5.15	Produce methane and co-products from biomass.

<b>Standard 6</b>	<b>FOOD PRODUCTS AND PROCESSING SYSTEMS</b>	
<b>Topic 6.1</b>	<i>Develop and implement procedures to ensure safety, sanitation, and quality in food product and processing facilities.</i>	
	<b>Student Competencies</b>	
	<b>6.1.1</b>	<b>ANALYZE AND MANAGE OPERATIONAL AND SAFETY PROCEDURES IN FOOD PRODUCTS AND PROCESSING FACILITIES.</b>
	6.1.1.1	Research and summarize the purposes and objectives of safety programs in food products and processing facilities (e.g., Sanitation Standard Operating Procedures (SSOP); Good Manufacturing Practices (GMP); worker safety, etc.).
	6.1.1.2	Research and categorize types of equipment used in food products and processing systems.
	6.1.1.3	Analyze and document attributes and procedures of current safety programs in food products and processing facilities.
	6.1.1.4	Assess specifications and maintenance needs for equipment and facilities used in food products and processing systems (e.g., specifications for machines, sanitation procedures, repair protocol, etc.).
	6.1.1.5	Construct plans that ensure implementation of safety programs for food products and processing facilities.
	6.1.1.6	Devise and implement strategies to maintain equipment and facilities for food products and processing systems.
	<b>6.1.2</b>	<b>APPLY FOOD SAFETY AND SANITATION PROCEDURES IN THE HANDLING AND PROCESSING OF FOOD PRODUCTS TO ENSURE FOOD QUALITY.</b>
	6.1.2.1	Examine and identify contamination hazards associated with food products and processing (e.g., physical, chemical, and biological).
	6.1.2.2	Research and summarize procedures of safe handling protocols (e.g., Hazard Analysis and Critical Control Points Plan (HACCP); Critical Control Point procedures (CCP); Good Agricultural Practices Plan (GAP), etc.).
	6.1.2.3	Research and summarize the purposes and objectives of quality assurance tests on food products (e.g., produce safety regulation, safe food transport, food contaminants, etc.).
	6.1.2.4	Describe the effects foodborne pathogens have on food products and humans.
	6.1.2.5	Outline procedures to eliminate possible contamination hazards associated with food products and processing.
	6.1.2.6	Construct plans that ensure implementation of safe handling procedures on food products.
	6.1.2.7	Design and construct experiments for quality assurance tests on food products.
	6.1.2.8	Explain, document, and execute the procedures of microbiological tests used to detect food-borne pathogens.
	6.1.2.9	Identify sources of contamination in food products and/or processing facilities and develop ways to eliminate contamination.

	6.1.2.10	Examine, interpret, and report outcomes from safe handling procedures and results from quality assurance tests.
	6.1.2.11	Interpret and evaluate results of quality assurance tests on food products and examine steps to implement corrective procedures.
	6.1.2.12	Conduct and interpret microbiological tests for food-borne pathogens.
	6.1.3	<b>APPLY FOOD SAFETY PROCEDURES WHEN STORING FOOD PRODUCTS TO ENSURE FOOD QUALITY.</b>
	6.1.3.1	Identify and summarize purposes of food storage procedures (e.g., first in/first out, temperature regulation, monitoring, etc.).
	6.1.3.2	Research and describe different electronic and paper-based documentation methods used to meet food safety and quality goals in food products and processing systems.
	6.1.3.3	Analyze characteristics of food products and determine appropriate storage procedures.
	6.1.3.4	Demonstrate and explain methods of documentation procedures within food products and processing systems.
	6.1.3.5	Prepare plans that ensure implementation of proper food storage procedures.
	6.1.3.6	Implement and evaluate the effectiveness of a documentation procedure used within a food products and processing facility and recommend improvements.
<b>Topic 6.2</b>	<i>Apply principles of nutrition, biology, microbiology, chemistry, and human behavior to the development of food products.</i>	
	<b>Student Competencies</b>	
	6.2.1	<b>APPLY PRINCIPLES OF NUTRITION AND BIOLOGY TO DEVELOP FOOD PRODUCTS THAT PROVIDE A SAFE, WHOLESOME, AND NUTRITIOUS FOOD SUPPLY FOR LOCAL AND GLOBAL FOOD SYSTEMS.</b>
	6.2.1.1	Research and summarize properties of common food constituents (e.g., proteins, carbohydrates, fats, vitamins, minerals).
	6.2.1.2	Research and report methods of nutritional planning to meet essential needs for the human diet (e.g., MyPlate).
	6.2.1.3	Compare and contrast the relative value of food constituents relative to food product qualities (e.g., taste, appearance, etc.).
	6.2.1.4	Compare and contrast the nutritional needs of different human diets.
	6.2.1.5	Analyze the properties of food products to identify food constituents and evaluate nutritional value.
	6.2.1.6	Construct methods to design a healthy daily food guide for a variety of nutritional needs.
	6.2.2	<b>APPLY PRINCIPLES OF MICROBIOLOGY AND CHEMISTRY TO DEVELOP FOOD PRODUCTS TO PROVIDE A SAFE, WHOLESOME, AND NUTRITIOUS FOOD SUPPLY FOR LOCAL AND GLOBAL FOOD SYSTEMS.</b>
	6.2.2.1	Examine and describe the basic chemical makeup of different types of food.

	6.2.2.2	Identify common food additives and identify their properties (e.g., preservatives, antioxidants, buffers, stabilizers, colors, flavors, etc.).
	6.2.2.3	Research and summarize the application of biochemistry in the development of new food products (e.g., value added food products, genetically engineered food products, etc.).
	6.2.2.4	Explain how the chemical and physical properties of foods influence nutritional value and eating quality.
	6.2.2.5	Describe the purpose of common food additives and how they influence the chemistry of food.
	6.2.2.6	Analyze how food products and processing facilities use biochemistry concepts to develop new food products.
	6.2.2.7	Design and conduct experiments to determine the chemical and physical properties of food products.
	6.2.2.8	Devise and apply strategies to determine what additives are utilized and why they are included in a variety of food products.
	6.2.2.9	Develop and implement plans to engineer new food items using biochemistry concepts.
	6.2.3	<b>APPLY PRINCIPLES OF HUMAN BEHAVIOR TO DEVELOP FOOD PRODUCTS TO PROVIDE A SAFE, WHOLESOME, AND NUTRITIOUS FOOD SUPPLY FOR LOCAL AND GLOBAL FOOD SYSTEMS.</b>
	6.2.3.1	Examine and explain the importance of food labeling to the consumer.
	6.2.3.2	Research and summarize relevant factors in planning and developing a new food product (e.g., regulation, creativity, economics, etc.).
	6.2.3.3	Examine, interpret, and explain the meaning of required components on a food label.
	6.2.3.4	Determine consumer preference and market potential for a new food product using a variety of methods (e.g., double-blind testing, etc.).
	6.2.3.5	Determine a strategy to prepare and label foods according to the established standards of regulatory agencies.
	6.2.3.6	Design new food products that meet a variety of goals (e.g., consumer preferences, market, nutritional needs, regulatory requirements, etc.).
<b>Topic 6.3</b>	<b><i>Select and process food products for storage, distribution, and consumption.</i></b>	
	<b>Student Competencies</b>	
	6.3.1	<b>IMPLEMENT SELECTION, EVALUATION AND INSPECTION TECHNIQUES TO ENSURE SAFE AND QUALITY FOOD PRODUCTS.</b>
	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.
	6.3.1.10	Develop, apply, and evaluate care and handling procedures to maintain original food quality and yield.
	6.3.1.11	Examine and respond to consumer concerns about the inspection and harvesting techniques of animals using accurate information based on regulatory agency approved or industry-approved techniques.
	6.3.1.12	Evaluate and grade food products from different classifications of food products.
	6.3.2	<b>DESIGN AND APPLY TECHNIQUES OF FOOD PROCESSING, PRESERVATION, PACKAGING, AND PRESENTATION FOR DISTRIBUTION AND CONSUMPTION OF FOOD PRODUCTS.</b>
	6.3.2.1	Identify and explain English and metric measurements used in the food products and processing industry.
	6.3.2.2	Differentiate between methods and materials used for processing food for different markets (e.g., fresh food products, ready to eat food products, etc.).
	6.3.2.3	Identify methods of food preservation and give examples of foods preserved by each method.
	6.3.2.4	Summarize types of materials and methods used in food packaging and presentation.
	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.).
	6.3.2.11	Devise and apply strategies to preserve different foods using various methods and techniques.
	6.3.2.12	Construct and implement methods of selecting packaging materials to store a variety of food products.
	6.3.3	<b>CREATE FOOD DISTRIBUTION PLANS AND PROCEDURES TO ENSURE SAFE DELIVERY OF FOOD PRODUCTS.</b>
	6.3.3.1	Assess and describe the environmental impact of distributing food locally and globally.
	6.3.3.2	Examine the various paths food products take to get from food processing centers to consumers.

	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.
	6.3.3.8	Make recommendations to improve safety procedures used in food distribution scenarios to ensure a safe product is being delivered to consumers.
	6.3.3.9	Propose distribution plans for food products that meet specific market demands.
<b>Topic 6.4</b>	<b><i>Explain the scope of the food industry and the historical and current developments of food product and processing.</i></b>	
<b>Student Competencies</b>		
	6.4.1	<b>EXAMINE THE SCOPE OF THE FOOD INDUSTRY BY EVALUATING LOCAL AND GLOBAL POLICIES, TRENDS, AND CUSTOMS FOR FOOD PRODUCTION.</b>
	6.4.1.1	Research and summarize examples of policy and legislation that affect food products and processing systems in the United States and around the world (e.g., labeling, GMOs, biosecurity, food system policy, dietary guidelines, etc.).
	6.4.1.2	Examine the impact of consumer trends on food products and processing practices (e.g., health and nutrition, organic, information about food products, local food movements, farm-to-fork supply chains, food system transparency, etc.).
	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.
	6.4.1.8	Devise and implement a strategy to create food products that meet a specific consumer trend in a specific market.
	6.4.1.9	Propose and implement culturally sensitive food processing and distribution practices.
	6.4.2	<b>EVALUATE THE SIGNIFICANCE AND IMPLICATIONS OF CHANGES AND TRENDS IN THE FOOD PRODUCTS AND PROCESSING INDUSTRY IN THE LOCAL AND GLOBAL FOOD SYSTEMS.</b>
	6.4.2.1	Describe and explain the components of the food products and processing industry (e.g., processing, distribution, byproducts, etc.).
	6.4.2.2	Identify and explain environmental and safety concerns about the food supply.

	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.).
	6.4.2.6	Evaluate desirable and undesirable outcomes of emerging technologies used in the food products and processing systems.
	6.4.2.7	Predict & defend upcoming changes & trends in the food products and processing industry.
	6.4.2.8	Examine and respond to consumer concerns about the environment and safety of the food supply using accurate information regarding food products and processing systems and practices.
	6.4.2.9	Research and evaluate the feasibility of implementing a current or emerging technology to improve a current food product or process used in a facility.
6.4.3	<b>IDENTIFY AND EXPLAIN THE PURPOSE OF INDUSTRY ORGANIZATIONS, GROUPS, AND REGULATORY AGENCIES THAT INFLUENCE THE LOCAL AND GLOBAL FOOD SYSTEMS.</b>	
	6.4.3.1	Examine and summarize the purposes of organizations that influence or regulate the food products and processing industry.
	6.4.3.2	Examine and describe the importance and usage of regulatory oversight of food safety and security in food products and processing (e.g., internationally, nationally, state, and local).
	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.
	6.4.3.5	Construct and implement methods to obtain data about organizations, groups, and regulatory agencies that affect the food products and processing industry.
	6.4.3.6	Construct and implement plans that ensure adherence to industry standards for food products and processing facilities.



<b>Standard 8</b>	<b>PLANT SYSTEMS</b>	
<b>Topic 8.3</b>	<i>Propagate, culture, and harvest plants and plant products based on current industry standards.</i>	
	<b>Student Competencies</b>	
	<b>8.3.5</b>	<b>HARVEST, HANDLE, AND STORE CROPS ACCORDING TO CURRENT INDUSTRY STANDARDS.</b>
	8.3.5.1	Identify and summarize harvesting methods and equipment.
	8.3.5.3	Research and summarize how safety is ensured at each stage of the following processes: harvesting, processing, and storing.
	8.3.5.4	Identify and categorize plant preparation methods for storing and shipping plants and plant products.
	8.3.5.5	Summarize the reasons for preparing plants and plant products for distribution.
	8.3.5.6	Assess the stage of growth to determine crop maturity or marketability and demonstrate proper harvesting techniques.
	8.3.5.8	Research and analyze practices used to maintain a safe product through harvest, processing, storage, and shipment (e.g., Food Safety Modernization Act, Good Agricultural Practices, etc.).
	8.3.5.9	Analyze the proper conditions required to maintain the quality of plants and plant products held in storage and during shipping.
	8.3.5.10	Demonstrate techniques for grading, handling, and packaging plants and plant products for distribution.
	8.3.5.11	Analyze the processes used by mechanical harvesting equipment.
	8.3.5.13	Research laws and apply regulations to ensure the production of plants and plant products that are safe for distribution and use.
	8.3.5.14	Monitor and evaluate environmental conditions in storage facilities for plants and plant products.
	8.3.5.15	Evaluate techniques for grading, handling, and packaging plants and plant products.

# 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.