INTRODUCTION TO AGRICULTURE

#01011

Description

This applied course is designed to introduce students to agriculture, its applications, and leadership development as the core foundation of the Agriculture Education program. Individual units will familiarize the student with: basic mechanical theory and skills – emphasis will be placed on safety and proper use of tools and equipment; principles of evaluation and selection of beef, swine, sheep, horse, and dairy animals; soil and plant relationships that affect the production of food and fiber. Topics may include: soils, irrigation, land judging, plants, crop and weed identification, range management, horticulture, nursery, diseases, insects, and chemicals.

This applied course introduces students to agricultural sciences with emphasis on technical skills, entrepreneurship, and occupational opportunities. Units may also include agricultural construction, food and fiber science, supervised agricultural experiences, and leadership development.

Agricultural mechanics units are designed to develop skills in selection, operation, and maintenance of engines, hydraulics, and agricultural machinery and tractors. Skills in operation and maintenance of equipment, determining a bill of materials, construction techniques, metal fabrication, and joining processes of metals and alloys will be included.

Emphasis is on problem solving and scientific reasoning applied to real world problems integrating knowledge from the life and earth sciences.

Grade 9-12

½ or 1 credit

Max Credit = 1

Standard 1	AGRICULTURE, FOOD, & NATURAL RESOURCES (AFNR) CLUSTER SKILLS		
Topic 1.1	***Analyze how issues, trends, technologies, and public policies impact systems in the Agriculture, Food, & Natural Resources Career Cluster.***		
	Student Competencies		
	1.1.1	**RESEARCH, EXAMINE, AND DISCUSS ISSUES AND TRENDS THAT IMPACT AFNR SYSTEMS ON LOCAL, STATE, NATIONAL, AND GLOBAL LEVELS.**	
		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.
	1.1.2	**EXAMINE TECHNOLOGIES AND ANALYZE THEIR IMPACT ON AFNR SYSTEMS.**	
		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.
	1.1.3	**IDENTIFY PUBLIC POLICIES AND EXAMINE THEIR IMPACT ON AFNR SYSTEMS.**	
		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.
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.**	
		1.3.1.1	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.
	1.3.3	**APPLY HEALTH AND SAFETY PRACTICES TO AFNR WORKPLACES.**	
		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.
	1.3.4	**USE APPROPRIATE PROTECTIVE EQUIPMENT AND DEMONSTRATE SAFE AND PROPER USE OF AFNR TOOLS AND EQUIPMENT.**	
		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.
Topic 1.4	***Demonstrate stewardship of natural resources in AFNR activities.***		
	Student Competencies		
	1.4.1	**IDENTIFY AND IMPLEMENT PRACTICES TO STEWARD NATURAL RESOURCES IN DIFFERENT AFNR SYSTEMS.**	
		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.
	1.4.2	**ASSESS AND EXPLAIN THE NATURAL RESOURCE RELATED TRENDS, TECHNOLOGIES, AND POLICIES THAT IMPACT AFNR SYSTEMS.**	
		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.
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.).**	
		1.5.1.1	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.).
	1.5.2	**EXAMINE AND CHOOSE CAREER OPPORTUNITIES THAT ARE MATCHED TO PERSONAL SKILLS, TALENTS, AND CAREER GOALS IN AN AFNR PATHWAY OF INTEREST.**	
		1.5.2.1	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.
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.**	
		1.6.1.1	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.).

Standard 2	AGRIBUSINESS SYSTEMS		
Topic 2.3	***Manage cash budgets, credit budgets, and credit for an AFNR business using generally accepted accounting principles.***		
	Student Competencies		
	2.3.1	**DEVELOP, ASSESS, & MANAGE CASH BUDGETS TO ACHIEVE AFNR BUSINESS GOALS.**	
		2.3.1.1	Compare and contrast components of cash budgets (e.g., anticipated revenue, production costs, overhead costs, profit, etc.) and identify the appropriate components to include in a budget given the nature of the AFNR enterprise.
		2.3.1.2	Research and summarize factors that impact management of cash budgets in AFNR businesses (e.g., changes in price of inputs/outputs, financial investment performance, capital purchases, human resources, etc.).
	2.3.2	**ANALYZE CREDIT NEEDS AND MANAGE CREDIT BUDGETS TO ACHIEVE AFNR BUSINESS GOALS.**	
		2.3.2.1	Research and summarize the characteristics of different types of credit instruments available to AFNR businesses (e.g., lines of credit, operating notes, alternative sources of capital, etc.).
		2.3.2.2	Examine and interpret the terms and conditions associated with credit instruments used in AFNR businesses (e.g., repayment terms, APR, grace periods, personal liability, interest rates, etc.).

Standard 3	ANIMAL SYSTEMS		
Topic 3.1	***Analyze historic and current trends impacting the animal systems industry.***		
	Student Competencies		
	3.1.1	**EVALUATE THE DEVELOPMENT AND IMPLICATIONS OF ANIMAL ORIGIN, DOMESTICATION, AND DISTRIBUTION ON PRODUCTION PRACTICES AND THE ENVIRONMENT.**	
		3.1.1.1	Identify and summarize the origin, significance, distribution, and domestication of different animal species.
		3.1.1.2	Research and summarize major components of animal systems (e.g., livestock, companion animal, etc.).

	3.1.2	**ASSESS AND SELECT ANIMAL PRODUCTION METHODS FOR USE IN ANIMAL SYSTEMS BASED UPON THEIR EFFECTIVENESS AND IMPACTS.**	
		3.1.2.1	Identify and categorize terms and methods related to animal production (e.g., sustainable, conventional, humanely raised, natural, organic, etc.).
		3.1.2.2	Research and examine marketing methods for animal products and services (e.g., conventional, niche markets, locally grown, etc.).
		3.1.2.3	Summarize the types, purposes, and characteristics of effective record keeping and documentation practices for animal systems enterprises (e.g., managing records for animal identification, feeding, breeding, treatment, income/expense, etc.).
		3.1.2.4	Identify and summarize wildlife management methods.
Topic 3.2	***Utilize best-practice protocols based upon animal behaviors for animal husbandry and welfare.***		
	Student Competencies		
	3.2.1	**DEMONSTRATE MANAGEMENT TECHNIQUES THAT ENSURE ANIMAL WELFARE.**	
		3.2.1.1	Explain the implications of animal welfare and animal rights for animal systems.
		3.2.1.2	Research and summarize the challenges involved in working with animals and resources available to overcome them (e.g., tools, technology, equipment, facilities, animal behavior signals, etc.).
		3.2.1.3	Distinguish between animal husbandry practices that promote animal welfare and those that do not.
	3.2.2	**ANALYZE PROCEDURES TO ENSURE THAT ANIMAL PRODUCTS ARE SAFE FOR CONSUMPTION (E.G., USE IN FOOD SYSTEM, ETC.).**	
		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.).
Topic 3.5	***Evaluate environmental factors affecting animal performance and implement procedures for enhancing performance and animal health.***		
	Student Competencies		
	3.5.1	**DESIGN ANIMAL HOUSING, EQUIPMENT, AND HANDLING FACILITIES FOR THE MAJOR SYSTEMS OF ANIMAL PRODUCTION.**	
		3.5.1.1	Differentiate between the types of facilities needed to house and produce animal species safely and efficiently.
		3.5.1.2	Identify and summarize equipment, technology, and handling facility procedures used in modern animal production (e.g., climate control devices, sensors, automation, etc.).
	3.5.2	**COMPLY WITH GOVERNMENT REGULATIONS AND SAFETY STANDARDS FOR FACILITIES USED IN ANIMAL PRODUCTION.**	
		3.5.2.1	Identify and summarize the general standards that must be met in facilities for animal production (e.g., environmental, zoning, construction, etc.).

		3.5.2.2	Distinguish between the types of laws and regulations pertaining to animal systems.
Topic 3.6	***Classify, evaluate, and select animals based on anatomical and physiological characteristics.***		
	Student Competencies		
	3.6.1	**CLASSIFY ANIMALS ACCORDING TO TAXONOMIC CLASSIFICATION SYSTEMS AND USE (E.G. AGRICULTURAL, COMPANION, ETC.).**	
		3.6.1.1	Explain the importance of the binomial nomenclature system for classifying animals.
		3.6.1.2	Compare and contrast major uses of different animal species (e.g., agricultural, companion, etc.).
		3.6.1.3	Identify and summarize common classification terms utilized in animal systems (e.g., external and internal body parts, maturity, mature male, immature female, animal products, breeds, etc.).
	3.6.2	**APPLY PRINCIPLES OF COMPARATIVE ANATOMY AND PHYSIOLOGY TO USES WITHIN VARIOUS ANIMAL SYSTEMS.**	
		3.6.2.1	Research and summarize characteristics of a typical animal cell and identify the organelles.
		3.6.2.2	Examine the basic functions of animal cells in animal growth and reproduction.
		3.6.2.3	Identify and summarize the properties, locations, functions, and types of animal cells, tissues, organs, and body systems.
	3.6.3	**SELECT AND TRAIN ANIMALS FOR SPECIFIC PURPOSES AND MAXIMUM PERFORMANCE BASED ON ANATOMY AND PHYSIOLOGY.**	
		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.

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.).**	
		4.1.1.1	Research and summarize the evolution of biotechnology in agriculture.
		4.1.1.2	Examine and categorize current applications and gains achieved in applying biotechnology to agriculture.
		4.1.1.3	Distinguish between current and emerging applications of biotechnology in agriculture.
		4.1.1.4	Compare and contrast the benefits and risks of biotechnology compared with alternative approaches to improving 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).**	
		4.1.3.1	Research and summarize the emergence, evolution, and implications of bioethics associated with biotechnology in agriculture.
		4.1.3.2	Research and summarize legal issues related to biotechnology in agriculture (e.g., protection of intellectual property through patents, copyright, trademarks, etc.).
		4.1.3.3	Research and summarize public perceptions of biotechnology in agriculture (e.g., social and cultural issues).

Standard 5	ENVIRONMENTAL SERVICE SYSTEMS		
Topic 5.2	***Evaluate the impact of public policies and regulations on environmental service system operations.***		
	Student Competencies		
	5.2.1	**INTERPRET AND EVALUATE THE IMPACT OF LAWS, AGENCIES, POLICIES, AND PRACTICES AFFECTING ENVIRONMENTAL SERVICE SYSTEMS.**	
		5.2.1.1	Distinguish between the types of laws associated with environmental service systems.
		5.2.1.2	Distinguish between the types of government agencies (i.e., local, state, and federal) associated with environmental service systems.
		5.2.1.3	Research policies, practices and initiatives common in business and advocacy groups associated with environmental service systems (e.g., zero-waste, LEED-certified, locally-grown, etc.).
	5.2.2	**COMPARE AND CONTRAST THE IMPACT OF CURRENT TRENDS ON REGULATION OF ENVIRONMENTAL SERVICE SYSTEMS (E.G., CLIMATE CHANGE, POPULATION GROWTH, INTERNATIONAL TRADE, ETC.).**	
		5.2.2.1	Research and categorize the purpose, implementation, and impact of greenhouse gas emission policies (e.g., cap-and-trade, emission offsetting, zero-emissions, carbon-neutrality, carbon sequestration, etc.).
		5.2.2.2	Research the impact of environmental service systems regulations on international trade.
		5.2.2.3	Examine and summarize the impact that population growth has on environmental service systems.
Topic 5.3	***Develop proposed solutions to environmental issues, problems, and applications using scientific principles of meteorology, soil science, hydrology, microbiology, chemistry, and ecology.***		
	Student Competencies		
	5.3.5	**APPLY ECOLOGY PRINCIPLES TO ENVIRONMENTAL SERVICE SYSTEMS.**	
		5.3.5.1	Research the role that biodiversity plays in environmental service systems and how biodiversity can be measured.
		5.3.5.2	Examine and explain the role played by habitats on environmental service systems.
		5.3.5.3	Research and explain how carrying capacities relate to environmental service systems (e.g., waste processing, rate or production of pollution, disease, etc.).
		5.3.5.4	Examine and describe how ecological interactions can be used to assess environmental service systems (i.e., macroinvertebrates and/or amphibians as bioindicators).

Standard 6	FOOD PRODUCTS AND PROCESSING SYSTEMS		
Topic 6.1	***Develop and implement procedures to ensure safety, sanitation, and quality in food product and processing facilities.***		
	Student Competencies		
	6.1.2	**APPLY FOOD SAFETY AND SANITATION PROCEDURES IN THE HANDLING AND PROCESSING OF FOOD PRODUCTS TO ENSURE FOOD QUALITY.**	
		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.
	6.1.3	**APPLY FOOD SAFETY PROCEDURES WHEN STORING FOOD PRODUCTS TO ENSURE FOOD QUALITY.**	
		6.1.3.1	Identify and summarize purposes of food storage procedures (e.g., first in/first out, temperature regulation, monitoring, etc.).

Standard 7	NATURAL RESOURCE SYSTEMS		
Topic 7.1	***Plan and conduct natural resource management activities that apply logical, reasoned, and scientifically based solutions to natural resource issues and goals.***		
	Student Competencies		
	7.1.1	**APPLY METHODS OF CLASSIFICATION TO EXAMINE NATURAL RESOURCE AVAILABILITY AND ECOSYSTEM FUNCTION IN A PARTICULAR REGION.**	
		7.1.1.1	Summarize and classify the different kinds of natural resources using common classification schemes (e.g., living vs. non-living, renewable vs. nonrenewable, native vs. introduced, etc.).
		7.1.1.2	Summarize the components that comprise all ecosystems.
		7.1.1.3	Summarize and classify different kinds of living species based on evolutionary traits.

	7.1.2	**CLASSIFY DIFFERENT TYPES OF NATURAL RESOURCES IN ORDER TO ENABLE PROTECTION, CONSERVATION, ENHANCEMENT, AND MANAGEMENT IN A PARTICULAR GEOGRAPHICAL REGION.**	
		7.1.2.1	Research and examine the characteristics used to identify trees and woody plants.
		7.1.2.2	Research and examine the characteristics used to identify herbaceous plants.
		7.1.2.3	Research and examine the characteristics used to identify wildlife and insects.
		7.1.2.4	Research and examine the characteristics used to identify aquatic species.
		7.1.2.5	Research and examine the characteristics used to identify non-living resources (e.g., soil types, climate, geography, etc.).
		7.1.2.6	Research the purpose and value of resource inventories and population studies.
	7.1.5	**APPLY ECOLOGICAL CONCEPTS AND PRINCIPLES TO TERRESTRIAL NATURAL RESOURCE SYSTEMS.**	
		7.1.5.1	Research and describe the stages of ecological succession.
		7.1.5.2	Compare and contrast the impact of habitat disturbances and habitat resilience.
		7.1.5.3	Compare and contrast techniques associated with sustainable forestry (e.g., timber stand improvement, diversity improvement, reforestation, etc.).
		7.1.5.4	Compare and contrast techniques associated with soil management (e.g., soil survey and interpretation, erosion control, etc.).
Topic 7.2	***Analyze the interrelationships between natural resources and humans.***		
	Student Competencies		
	7.2.2	**ASSESS THE IMPACT OF HUMAN ACTIVITIES ON THE AVAILABILITY OF NATURAL RESOURCES.**	
		7.2.2.1	Summarize the relationship between natural resources, ecosystems, and human activity.
		7.2.2.2	Categorize the primary causes of extinction of living species due to human activity (e.g., overharvesting, habitat loss, invasive species, pollution, etc.).
		7.2.2.3	Examine and describe the manner in which modern lifestyles are related to the depletion of natural resources.
	7.2.3	**ANALYZE HOW MODERN PERCEPTIONS OF NATURAL RESOURCE MANAGEMENT, PROTECTION, ENHANCEMENT, & IMPROVEMENT CHANGE & DEVELOP OVER TIME.**	
		7.2.3.1	Summarize and categorize the different social considerations in regards to the use of natural resources (e.g., public vs. private, laws and regulations, economics, green technology, etc.).
		7.2.3.2	Research and assess how historical figures played a prominent role in shaping how natural resources are viewed and used today (e.g., Aldo Leopold, Teddy Roosevelt, John Muir, Rachel Carson, Gaylord Nelson, etc.).
		7.2.3.3	Research how technology has affected the use and views of natural resources.

Standard 8	PLANT SYSTEMS		
Topic 8.2	***Apply principles of classification, plant anatomy, and plant physiology to plant production and management.***		
	Student Competencies		
	8.2.1	**CLASSIFY PLANTS ACCORDING TO TAXONOMIC SYSTEMS.**	
		8.2.1.1	Identify and summarize systems used to classify plants based on specific characteristics.
		8.2.1.2	Describe the morphological characteristics used to identify agricultural and herbaceous plants (e.g., life cycles, growth habit, plant use and as monocotyledons or dicotyledons, woody, herbaceous, etc.).
	8.2.2	**APPLY KNOWLEDGE OF PLANT ANATOMY AND THE FUNCTIONS OF PLANT STRUCTURES TO ACTIVITIES ASSOCIATED WITH PLANT SYSTEMS.**	
		8.2.2.1	Identify structures in a typical plant cell and summarize the function of plant cell organelles.
		8.2.2.2	Identify and summarize the components, the types, and the functions of plant roots.
		8.2.2.3	Identify and summarize the components and the functions of plant stems.
		8.2.2.4	Research and summarize leaf morphology and the functions of leaves.
		8.2.2.5	Identify and summarize the components of a flower, the functions of a flower, and the functions of flower components.
		8.2.2.6	Identify and summarize the functions and components of seeds and fruit.
	8.2.3	**APPLY KNOWLEDGE OF PLANT PHYSIOLOGY AND ENERGY CONVERSION TO PLANT SYSTEMS.**	
		8.2.3.1	Summarize the importance of photosynthesis to plant life on earth and the process of photosynthesis, including the types (c3, c4, Cam), its stages (e.g., light-dependent and light independent reactions), and its products and byproducts.
		8.2.3.2	Summarize the stages of cellular respiration including their products and byproducts.
		8.2.3.3	Summarize primary growth and the role of the apical meristem.
		8.2.3.4	Identify and categorize the five groups of naturally occurring plant hormones and synthetic plant growth regulators.
		8.2.3.5	Compare and contrast the effects of transpiration, translocation and assimilation on plants.

Standard 9	POWER, STRUCTURAL, AND TECHNICAL SYSTEMS		
Topic 9.1	***Apply physical science principles and engineering applications to solve problems and improve performance in AFNR power, structural, and technical systems.***		
	Student Competencies		
	9.1.1	**APPLY PHYSICAL SCIENCE AND ENGINEERING PRINCIPLES TO ASSESS AND SELECT ENERGY SOURCES FOR AFNR POWER, STRUCTURAL, AND TECHNICAL SYSTEMS.**	
		9.1.1.1	Research and identify renewable and nonrenewable energy sources used in AFNR.
		9.1.1.2	Compare and contrast the pathways of delivery for renewable and nonrenewable energy sources in an AFNR enterprise or business.
		9.1.1.3	Summarize methods and compare and contrast units used to benchmark energy use of AFNR structures (e.g., EUIs, BTUs, etc.).
	9.1.2	**APPLY PHYSICAL SCIENCE AND ENGINEERING PRINCIPLES TO DESIGN, IMPLEMENT, AND IMPROVE SAFE AND EFFICIENT MECHANICAL SYSTEMS IN AFNR SITUATIONS.**	
		9.1.2.1	Compare and contrast applications of simple machines in AFNR related mechanical systems.
		9.1.2.2	Identify the tools, machines, and equipment needed to construct and/or fabricate a project in AFNR.
		9.1.2.3	Examine owner's manuals to classify the types of safety hazards associated with different mechanical systems used in AFNR (e.g., caution, warning, danger, etc.).
	9.1.3	**APPLY PHYSICAL SCIENCE PRINCIPLES TO METAL FABRICATION USING A VARIETY OF WELDING AND CUTTING PROCESSES (E.G., SMAW, GMAW, GTAW, FUEL-OXYGEN AND PLASMA ARC TORCH, ETC.).**	
		9.1.3.1	Compare and contrast the principles and procedures of different welding and cutting processes (e.g., SMAW, GMAW, GTAW, fuel-oxygen and plasma arc torch, etc.).
		9.1.3.2	Compare and contrast the properties of different metals used in AFNR power, structural, and technical systems (e.g., malleability, conductivity, optical properties, chemical composition, etc.).
Topic 9.2	***Operate and maintain AFNR mechanical equipment and power systems.***		
	Student Competencies		
	9.2.1	**PERFORM PREVENTATIVE MAINTENANCE AND SCHEDULED SERVICE TO MAINTAIN EQUIPMENT, MACHINERY, AND POWER UNITS USED IN AFNR SETTINGS.**	
		9.2.1.1	Maintain the cleanliness and appearance of equipment, machinery, and power units used in AFNR power, structural, and technical systems to assure proper functionality.
		9.2.1.2	Examine operator's manuals to determine recommendations for servicing filtration systems and maintaining fluid levels on equipment, machinery, and power units used in AFNR power, structural, and technical systems.

	9.2.2	**OPERATE MACHINERY AND EQUIPMENT WHILE OBSERVING ALL SAFETY PRECAUTIONS IN AFNR SETTINGS.**	
		9.2.2.1	Research and summarize the use of equipment, machinery, and power units for AFNR power, structural, and technical systems.
		9.2.2.2	Examine and identify safety hazards associated with equipment, machinery, and power units used in AFNR power, structural, and technical systems (e.g., caution, warning, danger, etc.).
Topic 9.4	***Plan, build, and maintain AFNR structures.***		
	Student Competencies		
	9.4.1	**CREATE SKETCHES AND PLANS FOR AFNR STRUCTURES.**	
		9.4.1.1	Interpret and explain the meaning of symbols used in sketches of agricultural structures.
		9.4.1.2	Read and interpret the parts and/or views of plans for agricultural structures.
	9.4.2	**DETERMINE STRUCTURAL REQUIREMENTS, SPECIFICATIONS, AND ESTIMATE COSTS FOR AFNR STRUCTURES**	
		9.4.2.1	Summarize and categorize the information needed to complete a bill of materials and cost estimate for an AFNR structure.
		9.4.2.2	Research and summarize sources of industry construction and materials standards and their importance (e.g., American National Standards Institute, ANSI, Underwriters' Laboratories, UL, etc.).

Career Ready Practices (CRP)		
	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.**
	OTHER	
1	**FFA Student Handbook/Leadership**	
	1.1	**Explain aims and purposes of FFA.**
	1.2	**Explain importance of FFA as part of the Agriculture Education program.**
	1.3	**Memorize FFA motto and creed.**
	1.4	**Describe history of FFA.**
	1.5	**Describe opportunities available to FFA members.**
	1.6	**Define leadership.**
	1.7	**Explain the importance of effective leadership in agriculture.**
2	**Supervised Agricultural Experience (SAE)**	
	2.1	**Define SAE.**
	2.2	**Explain importance of SAE as part of the Agriculture Education program.**
	2.3	**Explain different types of SAEs (e.g. entrepreneur, placement, experimental research, non-experimental research, exploratory, directed activities, and improvement.**
	2.4	**Identify basic record book functions (e.g. goal setting, plan of action, leadership in FFA, community involvement).**
	2.5	**Explain goal setting.**
	2.6	**Write goals.**