NEBRASKA CAREER AND TECHNICAL EDUCATION

CTE®
Learning that works for Nebraska

NEBRASKA DEPARTMENT OF EDUCATION

AGRICULTURE, FOOD, AND NATURAL RESOURCES

PROGRAM OF STUDY STANDARDS

AGRICULTURE, FOOD, AND NATURAL RESOURCES

NEBRASKA CAREER AND TECHNICAL EDUCATION STATE MODEL PROGRAMS OF STUDY

CAREER FIELD OVERVIEW

The Agriculture, Food, and Natural Resources Career Field area provides opportunities for students to deepen their understanding of topics such as animal science, plant and soil science, agribusiness, food products and processing, power, structural, and technical systems, leadership and personal development, biotechnology, and environmental and natural resources.

PROGRAMS OF STUDY

Programs of Study are the primary delivery model for career and technical education (CTE) in Nebraska. They include a sequence of courses which progresses in specificity and rigor and are updated regularly to align with Nebraska's workforce needs and economic development priorities. This document includes the programs of study and course-based standards for the Agriculture, Food, and Natural Resources career field. These state model programs of study were developed to:

- Assist secondary schools in creating meaningful sequences of courses that adequately prepare individuals for seamless transitions to postsecondary education and careers eliminating duplication of coursework;
- Assist students in identifying appropriate courses for high school and postsecondary education that lead to their chosen career;
- Encourage collaboration between secondary and postsecondary education through curricular alignment;
- Offer opportunities for high-quality workplace experiences aligned to students' career interests;
- Promote the advancement of early postsecondary opportunities (including dual-credit courses) for all students; and
- Support postsecondary education options for students to further prepare them for successful transitions to their future careers.

Nebraska's programs of study are organized around Nebraska's CTE Model, which provides a way for students to explore the diversity of career options available to them.

NEBRASKA CAREER AND TECHNICAL EDUCATION MODEL

1 CORE ACADEMICS AND CAREER READINESS

At the center of the NCE Model is the expectation for all students to develop a solid academic core. The next ring identifies specific career readiness standards and practices that prepare students for success in postsecondary education as well as entrepreneurship/employment.

2 CAREER FIELDS

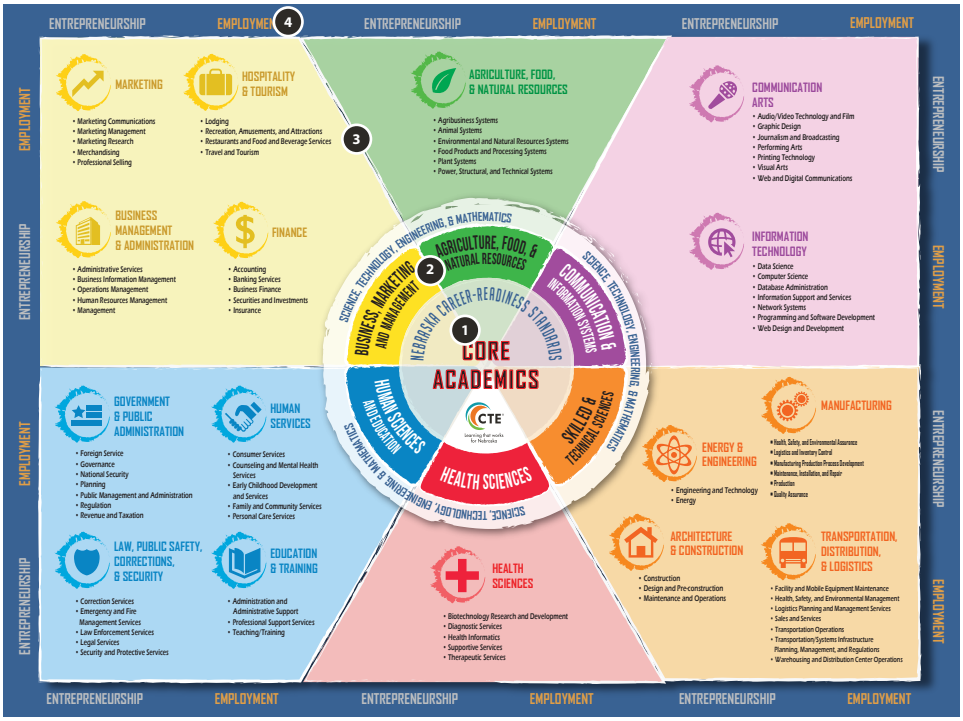
The six career fields represent broad sectors of the job market on which students may choose to focus.

3 CAREER CLUSTERS

Each career field is composed of career clusters radiating out from it. The clusters are more specific segments of the labor market. Each cluster is a grouping of careers that focus on similar subjects or similar skills. A basic understanding and exploration of each of the clusters will provide students with a solid foundation for career decision-making to conceptualize the entire world of work.

4 EMPLOYABILITY AND ENTREPRENEURSHIP

Career education provides the opportunity to gain the knowledge and skills for both employment and entrepreneurship. The reality for Nebraska and the United States is that entrepreneurship will help ensure economic growth and vitality. By infusing entrepreneurship competencies, career education is helping create the next generation of America's innovators and entrepreneurs.



The model is a visual map of "career fields" and "career clusters/pathways" and organizes the 16 National Career Clusters into six broad sectors of entrepreneurship and employment:

- Agriculture, Food and Natural Resources
- Business, Marketing and Management
- Communication and Information Systems
- Health Sciences
- Human Sciences and Education
- Skilled and Technical Sciences

These fields break down into more specific Career Clusters, Pathways and Occupational Specialties. The model provides a way for:

- Students to explore the diversity of career options available to them.
- Students to begin to prepare for their career with plans for secondary and post-secondary education.
- Schools to organize curriculum into Programs of Study that prepare students for opportunities in Nebraska's economy.

COURSE SEQUENCING

The courses within the State Model Program of Study are intended to be offered sequentially, to allow learners to build upon foundational knowledge and skills learned in introductory and intermediate courses and applied in more advanced capstone coursework. Non-duplicative sequences of courses ensure students transition to postsecondary education without duplication of classes and content. CTE enrollment data is collected at the course level. Students who participate and concentrate in CTE generally have more positive outcomes such as higher graduation rates along with postsecondary success.

Introductory Courses

Introductory courses set the foundation for a program of study by introducing students to broad foundational knowledge relative to an occupational area and career field.

Intermediate Courses

Intermediate courses build on the foundational knowledge of Introductory courses to further develop the academic, technical, and career readiness skills within a particular career field and occupational area.

Capstone Courses

Capstone courses are occupationally specific and further develop the necessary and required academic, technical, and career readiness skills needed for seamless transitions to postsecondary education and employment. Capstone courses often provide opportunities for students to earn postsecondary credit.

Levels of Participation

CTE Participant

A student who has earned one or more credits in any career and technical education program area.

CTE Concentrator

A secondary student who, in grades 9 through 12, has earned credit in at least two courses in a single career cluster program at the intermediate or capstone level.

State Model Programs of Study are coordinated, nonduplicative sequences of academic and technical content at the secondary and postsecondary levels that incorporate challenging State academic standards, address both academic and technical knowledge and skills, including Nebraska's Career Readiness Skills, are aligned with the needs of industries in Nebraska's economy, progress in specificity, have multiple entry and exit points that incorporate credentialing, and culminate in the attainment of a recognized postsecondary credential.

COURSE-BASED STANDARDS

Individual CTE courses, which make up the sequence of courses for Programs of Study, include content area standards and indicators to provide a framework for quality teaching and learning. While not required by state law, districts are encouraged to adopt these State Model Programs of Study and their related course-based standards. CTE State Model Programs of Study and course-based standards are revised on a five-year cycle to remain responsive to the rapid advances and needs of business and industry, help students explore a variety of postsecondary options and corresponding entrance requirements to help identify their next steps, and to align to changes in postsecondary programs.

Standards

At the highest level of generality, content area standards include a set of broad, overarching content-based statements that describe the basic cognitive, affective, or psychomotor expectations of students. They reflect long-term goals for learning.

Indicators

Under each standard are indicators, which further describe what a student must know and be able to do to meet the standard. Indicators are performance-based statements that provide educators with a clear understanding of the expected level of student learning and guidance. Indicators provide guidance for an assessment of student learning.

EXPANDED LEARNING OPPORTUNITIES

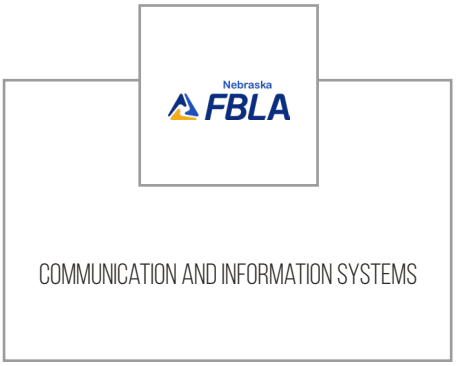
Expanded learning opportunities build on, support, and enhance learning within and outside of regular school programming. They are a critical component of Nebraska's educational landscape and should be intentionally supported to further develop students' college and career readiness. To signal aligned expanded learning opportunities, each Program of Study identifies additional areas where students may desire to personalize their program and take additional coursework or work-based learning that aligns with their interests. These expanded learning opportunities are not considered part of a Program of Study nor are they required, but rather a meaningful opportunity for students to continue to learn after completing the Program of Study sequence of courses within the context of their career interests. Along with aligned coursework, two prominent expanded learning opportunities include participating in Work-based Learning or a Career and Technical Student Organization.

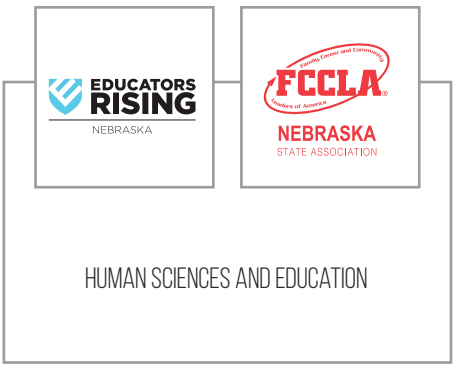
Work-Based Learning

Work-Based Learning (WBL) connects learners with employers to prepare them for success in an everchanging workplace. WBL is a planned program of meaningful experiences related to the career interests of learners that enables them to acquire knowledge and skills in a real or simulated work setting. It requires strong partnerships between schools, colleges, and local employers. WBL is learning through work, not simply learning about work. Expanding high-quality WBL opportunities for students is one of Nebraska's CTE strategic priorities and is a program quality accountability indicator. Nebraska CTE affirms WBL as a critical component of career development. Throughout the State Model Programs of Study, courses where WBL is embedded into the class is noted in the course title (e.g., "Introduction to Agriculture, Food, and Natural Resources with Work-Based Learning"). It is also signaled as an expanded learning opportunity across all programs of study.

Career And Technical Student Organizations

Career and Technical Student Organizations (CTSOs) are an extension of classroom instruction—applying classroom learning to real-world experiences. CTSOs provide opportunities for all students to develop career readiness skills through activities, competitions, and community service. Nebraska recognizes seven CTSOs aligned with the state's Programs of Study and career field areas. These include:





CAREER READINESS STANDARDS

Embedded into the State Model Programs of Study and courses are the Nebraska Career Readiness standards. These standards rest on important "practices and proficiencies" with long-standing importance in career education. These standards and related practices are not limited to formal CTE programs nor to the middle school or high school level. Rather, these standards and practices should be used over and over again with increasing complexity and relevance by students as they progress through their educational pathway. The standards themselves do not dictate curriculum, pedagogy or delivery of content. Schools and colleges may handle the teaching and assessing of these standards in many different ways.

THE CAREER READY INDIVIDUAL...

1. Applies appropriate academic and technical skills

2. Communicates effectively and appropriately

3. Contributes to employer and community success

4. Makes sense of problems and perseveres in solving them

5. Uses critical thinking

6. Demonstrates innovation and creativity

7. Models ethical leadership and effective management

8. Works productively in teams and demonstrates cultural competency

9. Utilizes technology

10. Manages personal career development

11. Attends to personal and financial well-being

AGRICULTURE, FOOD, AND NATURAL RESOURCES

PROGRAMS OF STUDY

AGRICULTURE, FOOD, AND NATURAL RESOURCES

Program of Study Name	Introductory Course	Intermediate Course	Capstone Course	Expanded Learning Opportunity
AGRICULTURAL POWER, STRUCTURE, & TECHNOLOGY	011000 - Introduction to AFNR, OR 018060 - CASE Introduction to AFNR	016004 - Welding, OR 016000 - Power, Structural, & Technology Systems Fundamentals, OR 018066 - CASE Agriculture Power & Technology	016005 - Metals & Fabrication, OR 011018 - Agricultural Technology, OR 016006 - Precision Agriculture, OR 016003 - Advanced Power, Structural, & Technology Systems	017000 - Agriculture, Food, and Natural Resources Leadership and Career Readiness, with Work-Based Learning 320702 - Agriculture, Food, And Natural Resources Work Based Learning Experience
AGRIBUSINESS	011000 - Introduction to AFNR, OR 018060 - CASE Introduction to AFNR	011009 - Agricultural Business, OR 018067 - CASE Agribusiness	011011 - Agricultural Sales, OR 011017 - Agricultural Communication, OR 011010 - Agricultural Economics, OR 012005 - Agricultural Entrepreneurship	017000 - Agriculture, Food, and Natural Resources Leadership and Career Readiness, with Work-Based Learning 320702 - Agriculture, Food, And Natural Resources Work Based Learning Experience
ANIMAL SCIENCE	011000 - Introduction to AFNR, OR 018060 - CASE Introduction to AFN	011004 - Animal Science, OR 018062 - CASE Animal Science	011006 - Small Animal Management, OR 011005 - Large Animal Management, OR 011015 - Veterinary Science, OR 012004 - Agricultural Biotechnology, OR 018063 - CASE Animal and Plant Biotechnology	017000 - Agriculture, Food, and Natural Resources Leadership and Career Readiness, with Work-Based Learning 320702 - Agriculture, Food, And Natural Resources Work Based Learning Experience
DIVERSIFIED AGRICULTURAL SCIENCE	011000 - Introduction to AFNR, OR 018060 - CASE Introduction to AFNR	011019 - Diversified Agriculture	011020 - Integrated Agricultural Science	017000 - Agriculture, Food, and Natural Resources Leadership and Career Readiness, with Work-Based Learning 320702 - Agriculture, Food, And Natural Resources Work Based Learning Experience

AGRICULTURE, FOOD, AND NATURAL RESOURCES

PROGRAMS OF STUDY

AGRICULTURE, FOOD, AND NATURAL RESOURCES

Program of Study Name	Introductory Course	Intermediate Course	Capstone Course	Expanded Learning Opportunity
ENVIRONMENTAL & NATURAL RESOURCES	011000 - Introduction to AFNR, OR 018060 - CASE Introduction to AFNR	013000 - Environmental & Natural Resources, OR 018064 - CASE Natural Resources and Ecology	013001 - Wildlife Management, OR 013002 - Environmental & Natural Resources Management	017000 - Agriculture, Food, and Natural Resources Leadership and Career Readiness, with Work-Based Learning 320702 - Agriculture, Food, And Natural Resources Work Based Learning Experience
FOOD PRODUCTS & PROCESSING	011000 - Introduction to AFNR, OR 018060 - CASE Introduction to AFNR	014000 - Food Science & Safety, OR 018065 - CASE Food Science & Safety	014001 - Food Products & Technology	017000 - Agriculture, Food, and Natural Resources Leadership and Career Readiness, with Work-Based Learning 320702 - Agriculture, Food, And Natural Resources Work Based Learning Experience
PLANT SCIENCE	011000 - Introduction to AFNR , OR 018060 - CASE Introduction to AFNR	011007 - Plant Science, OR 018061 - CASE Plant Science	011008 - Crop Management & Agronomy, OR 012001 - Nursery Management, OR 012006 - Landscape Design, OR 012002 - Floriculture, OR 012004 - Agricultural Biotechnology, OR 018063 - CASE Animal and Plant Biotechnology	017000 - Agriculture, Food, and Natural Resources Leadership and Career Readiness, with Work-Based Learning 320702 - Agriculture, Food, And Natural Resources Work Based Learning Experience

INTRODUCTION TO AGRICULTURE, FOOD, AND NATURAL RESOURCES

COURSE DESCRIPTION

The introductory course for the Agriculture, Food, and Natural Resources Career Cluster provides a knowledge base in the major components of the industry. Learners will be exposed to a broad range of agriculture, food, and natural resources careers, cluster foundation knowledge and skills, and introduction to leadership development and the National FFA Organization (FFA). Classroom and laboratory activities are supplemented through supervised agricultural experiences, career exploration activities, and FFA leadership programs & activities.

STANDARDS AND INDICATORS:

AFNR.HS.20.1 Apply leadership skills and knowledge through the study of the FFA Career and Technical Student Organization (CTSO).

AFNR.HS.20.1.a	Summarize the three-component model of a comprehensive Agricultural Education Program.
AFNR.HS.20.1.b	Recognize the mission, purpose, and key historical moments in the National FFA Organization.
AFNR.HS.20.1.c	Investigate opportunities available for a member of the FFA.
AFNR.HS.20.1.d	Examine and practice public speaking.
AFNR.HS.20.1.e	Apply the basic principles of Parliamentary Procedure.

AFNR.HS.20.2 Apply career readiness principles in an authentic workplace environment.

AFNR.HS.20.2.a	Summarize the five components of a Foundational Supervised Agricultural Experience (SAE).
AFNR.HS.20.2.b	Investigate the five options for an Immersion SAE
AFNR.HS.20.2.c	Articulate elements of career plans (e.g., academic, AFNR/CTE coursework, FFA/CTSO participation, immersion SAE) required in an AFNR workplace setting.

INTRODUCTION TO AGRICULTURE, FOOD, AND NATURAL RESOURCES (cont.)

AFNR.HS.20.3 Examine career options within agriculture, food, and natural resource systems and perform research based on personal interests.

AFNR.HS.20.3.a	Inventory personal work preferences and interests related to the AFNR Career Field.
AFNR.HS.20.3.b	Identify careers available in multiple AFNR Career Pathways.
AFNR.HS.20.3.c	Determine common qualities of a specific career area (e.g., educational requirements, work environment).
AFNR.HS.20.3.d	Identify necessary steps to prepare for a specific AFNR careers (e.g., coursework, post-secondary, needed skills).
AFNR.HS.20.3.e	Identify opportunities for work placed learning within your community.

AFNR.HS.20.4 Evaluate the role of water, air, soil, and habitat in the management of natural resource systems.

AFNR.HS.20.4.a	Summarize and classify the different natural resources (e.g., water, soil, renewable, non-renewable).
AFNR.HS.20.4.b	Summarize the components that comprise all ecosystems.
AFNR.HS.20.4.c	Compare and categorize biotic and abiotic factors in various habitats.
AFNR.HS.20.4.d	Identify the importance of water and air quality.
AFNR.HS.20.4.e	Identify the physical qualities of the soil that determine use for the environmental service system.
AFNR.HS.20.4.f	Describe the importance of water conservation.

INTRODUCTION TO AGRICULTURE, FOOD, AND NATURAL RESOURCES (cont.)

AFNR.HS.20.5 Differentiate key terms, components, and uses for animals in animal systems.

AFNR.HS.20.5.a	Identify and summarize key terminology used in animal systems (e.g., heifer vs. cow, bull vs. steer, calving, farrowing, bovine, equine).
AFNR.HS.20.5.b	Define the function of basic external and internal organs of animals.
AFNR.HS.20.5.c	Differentiate production animals from companion animals.
AFNR.HS.20.5.d	Classify the major components of production animal systems (e.g., feedlots, cow-calf operations, farrow, finish) and regional distribution.
AFNR.HS.20.5.e	Categorize uses for and products generated from production animals.
AFNR.HS.20.5.f	Classify and determine uses for companion animals.

AFNR.HS.20.6 Summarize knowledge of plant anatomy and the functions of plant structures and processes to activities associated with plant systems.

AFNR.HS.20.6.a	Classify major components of the plant industry.
AFNR.HS.20.6.b	Classify plants according to life cycles.
AFNR.HS.20.6.c	Identify the function of plant parts.
AFNR.HS.20.6.d	Identify basic processes and role of photosynthesis, respiration, and transpiration.
AFNR.HS.20.6.e	Differentiate between sexual and asexual propagation techniques.

AFNR.HS.20.7 Synthesize the historical, social, cultural, and potential applications of biotechnology.

AFNR.HS.20.7.a	Summarize biotechnology and the historical impact it has had on agriculture.
AFNR.HS.20.7.b	Identify current and future applications of biotechnology in agriculture, food, and natural resources.
AFNR.HS.20.7.c	Identify common methodologies used in biotechnology.
AFNR.HS.20.7.d	Identify basic cellular structures and genetic terminology.
AFNR.HS.20.7.e	Summarize the scientific and social implications of modern genetically modified organisms.

INTRODUCTION TO AGRICULTURE, FOOD, AND NATURAL RESOURCES (cont.)

AFNR.HS.20.8 Summarize knowledge of the food products & processing industry.

AFNR.HS.20.8.a Evaluate how different foods affect the human body and its physical and cellular processes.

AFNR.HS.20.8.b Identify food safety and sanitation procedures for handling and processing to assure food quality.

AFNR.HS.20.8.c Summarize food safety procedures when storing and distributing products to consumers.

AFNR.HS.20.8.d Explain the producer-to-consumer processes in the food industry.

AFNR.HS.20.9 Summarize management principles, skills, and practices in agribusiness.

AFNR.HS.20.9.a Define major sectors within the agribusiness industry.

AFNR.HS.20.9.b Identify standard production and agribusiness records and plans.

AFNR.HS.20.9.c Identify common agribusiness terminology and tools to track and analyze business decisions and transactions.

AFNR.HS.20.9.d Articulate the role of markets, trade, competition, and price in relation to business sales and market planning.

AFNR.HS.20.9.e Identify aspects needed to develop and implement an effective record keeping strategy for financial and human resources.

AFNR.HS.20.10 Create an agricultural project using knowledge of power, structural and technical systems (e.g. procedures, operations, safety, tools, and equipment).

AFNR.HS.20.10.a Identify and practice safe laboratory practices and procedures.

AFNR.HS.20.10.b Select and operate proper tools and equipment related to agricultural processes observing all safety precautions.

AFNR.HS.20.10.c Develop an agricultural project plan with the required project plan components (e.g., purpose, materials, budget, skills required, timeframe).

AFNR.HS.20.10.d Assess a project plan to completion.

WELDING

COURSE DESCRIPTION

This course provides an in-depth study of welding principles and applications in a classroom/agricultural laboratory/shop setting to help students understand and prepare for the opportunities in current welding and agricultural associated careers. Through hands on applications and comprehensive technical content students will develop foundational knowledge and skills for welding processes. Classroom and laboratory activities are supplemented through supervised agricultural experiences, and FFA leadership programs & activities.

STANDARDS AND INDICATORS:

AFNR.HS.9.1. Demonstrate professional standards/employability skills as required by welding professionals associated with the agricultural industry.

AFNR.HS.9.1.a	Identify career development and opportunities in the associated fields of the welding industry.
AFNR.HS.9.1.b	Apply information in career planning and employment situations related to agricultural welding.
AFNR.HS.9.1.c	Compare certifications, credentialing, and compliance within the industry.

AFNR.HS.9.2 Apply safety principles, practices, and guidelines to the work environment.

AFNR.HS.9.2.a	Demonstrate knowledge of safety principles for the laboratory environment and industry.
AFNR.HS.9.2.b	Identify personal and occupational health practices including safety and first-aid practices.
AFNR.HS.9.2.c	Demonstrate awareness of safety devices assembled and installed correctly on tools and devices.
AFNR.HS.9.2.d	Apply the requirements of eye safety protection and other Personal Protection Equipment.
AFNR.HS.9.2.e	Identify the injuries/illnesses possible in the industry and laboratory.

WELDING (cont.)

AFNR.HS.9.3 Perform precision measurements.

AFNR.HS.9.3.a Select and use proper measuring devices.

AFNR.HS.9.3.b Utilize math formulas to complete work and job tasks.

AFNR.HS.9.3.c Measure components to begin project preparations.

AFNR.HS.9.4 Demonstrate use of welding symbols, materials, and weldability.

AFNR.HS.9.4.a Develop and identify basic drawings, types, symbols, and list of materials.

AFNR.HS.9.4.b Demonstrate the ability to read and/or produce prints.

AFNR.HS.9.4.c Identify and explain the knowledge of materials, their properties, and methods to use them.

AFNR.HS.9.4.d Estimate materials and cost associated.

AFNR.HS.9.5 Demonstrate types of assembling processes.

AFNR.HS.9.5.a Demonstrate welding techniques used in an agricultural setting with the following processes: O-A, Arc, GMAW, and/or GTAW.

AFNR.HS.9.5.b Utilize appropriate procedures to the design and production of a manufactured agricultural part or component.

AFNR.HS.9.5.c Identify the proper finish for the selected materials.

POWER, STRUCTURAL, AND TECHNOLOGY SYSTEMS FUNDAMENTALS

COURSE DESCRIPTION

This course is designed to provide students with introductory level experiences in selected major areas of agricultural mechanics technology which may include woodworking, agricultural structures, electrical wiring, introductory arc welding, oxy/fuel cutting and welding processes, and power equipment operation and maintenance. Learning activities include information, skill development, and problem solving. Classroom and laboratory activities are supplemented through supervised agricultural experiences, and FFA leadership programs & activities.

STANDARDS AND INDICATORS:

AFNR.HS.26.1 Identify careers in the agricultural mechanics industry in the areas of agricultural construction, agricultural electrical systems, welding and metal fabrication, and agriculture power machinery.

AFNR.HS.26.1.a Identify career opportunities in Agricultural Mechanics in the local community.

AFNR.HS.26.1.b Identify professional organizations associated with agricultural mechanics skills and related occupations.

AFNR.HS.26.1.c Apply information in career planning and employment situations related to agricultural mechanics.

AFNR.HS.26.2 Model principles of a safe work environment, including safety practices.

AFNR.HS.26.2.a Identify potential hazards in the agricultural mechanics laboratory and/or work setting.

AFNR.HS.26.2.b Select safety equipment and procedures for various agriculture-related activities.

AFNR.HS.26.2.c Demonstrate safety procedures and behavior while working in the agriculture classroom, labs, and/or work sites.

AFNR.HS.26.2.d Identify personal protective equipment required for various activities conducted in the agricultural mechanics laboratory and industry.

AFNR.HS.26.2.e Safely operate all hand tools, power tools, and equipment in the agricultural mechanics laboratory.

POWER, STRUCTURAL, AND TECHNOLOGY SYSTEMS FUNDAMENTALS (cont.)

AFNR.HS.26.3 Demonstrate the safe use of common tools and materials used in woodworking and agricultural construction.

AFNR.HS.26.3.a Identify common woodworking tools used (e.g., hand tools, power tools, layout tools, measuring tools).

AFNR.HS.26.3.b Demonstrate the proper care and use of tools (e.g., hand tools, layout tools, measuring tools).

AFNR.HS.26.3.c Demonstrate appropriate techniques for restoring worn, damaged, or abused tools to good working condition.

AFNR.HS.26.4 Select appropriate types of lumber, fasteners, and finish materials used in woodworking and agricultural construction.

AFNR.HS.26.4.a Describe common woods including characteristics and uses.

AFNR.HS.26.4.b Classify common dimensions of wood materials.

AFNR.HS.26.4.c Select appropriate screws, nails, bolts, and other fasteners for various uses.

AFNR.HS.26.4.d Compare different types of wood glues and their recommended uses.

AFNR.HS.26.4.e Identify proper woodworking and agricultural construction preserving/finishing materials.

AFNR.HS.26.5 Demonstrate knowledge of electrical principles, tools, and materials necessary for planning and installation of electrical circuits for agricultural and residential applications.

AFNR.HS.26.5.a Describe the basic principles of electrical theory.

AFNR.HS.26.5.b Describe types of electrical circuits.

AFNR.HS.26.5.c Define electrical terms and relationship between them (e.g., watts, volts, amps and resistance).

AFNR.HS.26.5.d Explain the purpose of the National Electrical Code.

POWER, STRUCTURAL, AND TECHNOLOGY SYSTEMS FUNDAMENTALS (cont.)

AFNR.HS.26.5 Demonstrate knowledge of electrical principles, tools, and materials necessary for planning and installation of electrical circuits for agricultural and residential applications.

AFNR.HS.26.5.a Describe the basic principles of electrical theory.

AFNR.HS.26.5.b Describe types of electrical circuits.

AFNR.HS.26.5.c Define electrical terms and relationship between them (e.g., watts, volts, amps resistance).

AFNR.HS.26.5.d Explain the purpose of the National Electrical Code.

AFNR.HS.26.5.e Identify electrical symbols used in electrical schematics and floor plans of agricultural facilities.

AFNR.HS.26.5.f Use appropriate electrical symbols and follow National Electrical Code requirements for electrical schematics

AFNR.HS.26.5.g Demonstrate commonly used electrical tools in the agricultural industry.

AFNR.HS.26.5.h Identify types of electrical cable used in agricultural applications.

AFNR.HS.26.5.i Calculate load for specific circuit applications and describe potential hazards of overloads on a circuit.

AFNR.HS.26.5.j Select conductors for circuit applications based on given load, location, temperature, and distance parameters.

AFNR.HS.26.5.k Compare and contrast switches, receptacles, lighting outlet devices, grounding conductors, solderless connectors, and related materials for use in agricultural and residential electric circuits.

AFNR.HS.26.5.l Identify steps in installing branch circuit enclosures, conductors and devices.

POWER, STRUCTURAL, AND TECHNOLOGY SYSTEMS FUNDAMENTALS (cont.)

AFNR.HS.26.6 Apply the operating principles of a four stroke engine, including components of and proper maintenance procedures, in accordance with the manufacturer's recommendations.

AFNR.HS.26.6.a Explain how a small engine operates.

AFNR. HS.26.6.b Compare the similarities and differences between four-stroke-cycle engines and two-stroke-cycle engines.

AFNR.HS.26.6.c Interpret service and parts manuals for small engines and identify operating instructions and safety procedures for operating small engines.

AFNR.HS.26.6.d Identify tools commonly used for small engine service and repair.

AFNR.HS.26.6.e Create a maintenance calendar utilizing small engine owner's manuals.

AFNR.HS.26.6.f Perform basic service procedures according to manufacturer's recommendations.

AFNR.HS.26.6.g Compare proper maintenance procedures using service manuals from a variety of small engine manufacturers.

AFNR.HS.26.7 Demonstrate the safe and efficient operation of agricultural tractors and related equipment.

AFNR.HS.26.7.a Identify common types of machinery used in the agricultural industry.

AFNR.HS.26.7.b Describe the functions and purposes of common types of machinery used in the agriculture industry.

METALS AND FABRICATION

COURSE DESCRIPTION

This course provides an in-depth study of metals and fabrication with metal products. It also provides the opportunity to develop, design, and construct metal fabrication projects. Classroom and laboratory activities are supplemented through supervised agricultural experiences, and FFA leadership programs & activities.

STANDARDS AND INDICATORS:

AFNR.HS.23.1 Demonstrate professional standards/employability skills as required by the industry.

AFNR.HS.23.1.a	Identify career-development opportunities and opportunities in the associated fields of the welding industry.
AFNR.HS.23.1.b	Apply metal and fabrication concepts in career situations related to metals and fabrication .
AFNR.HS.23.1.c	Examine certifications, credentialing, and compliance within the industry.

AFNR.HS.23.2 Demonstrate safety principles, practices, and guidelines to the work environment.

AFNR.HS.23.2.a	Demonstrate knowledge of safety principles for the laboratory environment and industry.
AFNR.HS.23.2.b	Identify personal and occupational health practices including safety and first-aid practices.
AFNR.HS.23.2.c	Demonstrate awareness of safety devices assembled and installed correctly on tools and devices.
AFNR.HS.23.2.d	Apply the requirements of eye safety protection and other Personal Protection Equipment.
AFNR.HS.23.2.e	Identify potential injuries or illnesses from the industry and laboratory setting.

METALS AND FABRICATION (cont.)

AFNR.HS.23.3 Summarize the components of proper handling and storage of materials.

AFNR.HS.23.3.a Identify the proper storage methods of chemicals, hazardous materials, and metal products.

AFNR.HS.23.3.b Demonstrate proper orientation and operation of all equipment in the laboratory.

AFNR.HS.23.3.c Identify the composition and classification of the materials.

AFNR.HS.23.4 Summarize the scheduling process of a product.

AFNR.HS.23.4.a Identify the steps required and equipment needed to create the product.

AFNR.HS.23.4.b Define schedule requirements to create a product.

AFNR.HS.23.4.c Identify materials used in the fabrication process.

AFNR.HS.23.5 Create a project design, draw, construct, and preserve a metalworking project.

AFNR.HS.23.5.a Plan metalworking projects using simple drawing techniques.

AFNR.HS.23.5.b State the use and format of the project and calculate a bill of materials.

AFNR.HS.23.5.c Apply metalworking knowledge to plan a project using hand and power tools while demonstrating the safe use of these tools according to industry standards.

AFNR.HS.23.5.d Utilize the proper techniques of welding, cutting, and shaping metal for the construction of the project.

AFNR.HS.23.5.e Prepare metal projects for finishing by selecting and using appropriate materials for grinding, sanding, and polishing with appropriate materials and finishes.

AGRICULTURAL TECHNOLOGY

COURSE DESCRIPTION

Agricultural Technology is designed to introduce students to the technology utilized in the agricultural industry. Students will build a basis of knowledge of technology utilized in the various components of crop and livestock production. Classroom and laboratory activities are supplemented through supervised agricultural experiences, and FFA leadership programs & activities.

STANDARDS AND INDICATORS:

AFNR.HS.8.1 Assess agricultural technology and how it relates to modern agriculture.

AFNR.HS.8.1.a Identify a variety of agricultural technologies used in production agriculture (e.g., livestock, agronomy, agribusiness, horticulture).

AFNR.HS.8.1.b Compare historical technologies and how agriculture changed through different revolutions.

AFNR.HS.8.1.c Discuss how technologies relate and interact with modern agriculture.

AFNR.HS.8.2 Identify the components of the Global Positioning Systems (GPS).

AFNR.HS.8.2.a Describe the design of GPS.

AFNR.HS.8.2.b Identify factors influencing GPS accuracy and potential uses/applications.

AFNR.HS.8.2.c Utilize GPS to solve problems in the agricultural industry.

AFNR.HS.8.2.d Describe steps to install, maintain, and service instrumentation and equipment used for precision technologies.

AFNR.HS.8.2.e Identify various precision technologies in planning crop production (e.g., precision soil sampling techniques, variable rate applications, precision planting applications)

AFNR.HS.8.3 Demonstrate Geographic Information Systems (GIS) Software.

AFNR.HS.8.3.a Utilize GIS software to create, analyze, and edit production maps.

AFNR.HS.8.3.b Analyze the economic impact of using GIS and other geospatial technologies.

AFNR.HS.8.3.c Classify data for usage in GIS software.

AGRICULTURAL TECHNOLOGY (cont.)

AFNR.HS.8.4 Utilize legal description and mapping data.

AFNR.HS.8.4.a Analyze methods of describing and locating land.

AFNR.HS.8.4.b Differentiate types of legal description (e.g., Rectangular Government Survey, Metes and Bounds, Lot/Block Numbering on a Plat Map).

AFNR.HS.8.4.c Demonstrate the ability to locate land using GPS, GIS, and/or Legal Descriptions.

AFNR.HS.8.5 Compare and contrast current Unmanned Aerial vehicles and drone systems.

AFNR.HS.8.5.a Identify how UAV's are utilized in many different areas of agriculture.

AFNR.HS.8.5.b Identify the government rules and regulations associated with UAV's for making man agement decisions within the agriculture sector.

AFNR.HS.8.5.c Classify different types of drones and how they are used.

PRECISION AGRICULTURE

COURSE DESCRIPTION

This course is designed to build on the knowledge from previous courses so the student can learn principles and applications in precision agriculture such as GIS, GPS, data acquisition and management, and related components. Classroom and laboratory activities are supplemented through supervised agricultural experience, and FFA leadership programs & activities.

STANDARDS AND INDICATORS:

AFNR.HS.27.1 Identify precision agriculture technology.

AFNR.HS.27.1.a	Identify various precision agriculture equipment and their uses within the industry.
AFNR.HS.27.1.b	Identify historical and current modes of precision agriculture.
AFNR.HS.27.1.c	Identify Global Navigation Satellite Systems and components.

AFNR.HS.27.2 Identify the different hardware components of precision agriculture.

AFNR.HS.27.2.a	Define the electrical and hydraulic key components of equipment in precision agriculture.
AFNR.HS.27.2.b	Identify factors influencing GPS accuracy and potential uses/applications.
AFNR.HS.27.2.c	Apply GPS to solve problems in the agricultural industry.
AFNR.HS.27.2.d	Install, maintain, and service instrumentation and equipment used for precision technologies.
AFNR.HS.27.2.e	Identify various precision technologies in planning crop production activities (e.g., Precision soil sampling techniques, variable rate applications, precision planting applications.)

PRECISION AGRICULTURE (cont.)

AFNR.HS.27.3 Utilize precision agriculture software to help make management decisions.

AFNR.HS.27.3.a	Utilize various softwares to create, analyze, and edit production maps.
AFNR.HS.27.3.b	Synthesize the economic impact of using GIS and other geospatial technologies.
AFNR.HS.27.3.c	Classify data for usage in agricultural-based softwares.

AFNR.HS.27.4 Utilize precision technology in livestock production.

AFNR.HS.27.4.a	Analyze precision technology available in the livestock industry.
AFNR.HS27.4.b	Utilize data acquired from precision devices to assist in management decisions of the livestock.
AFNR.HS.27.4.c	Compare data from breed associations to numerical information acquired from local or area data.
AFNR. HS27.4.d	Summarize the technology behind Genomic Enhanced Expected Progeny Difference.

ADVANCED POWER, STRUCTURAL, AND TECHNOLOGY SYSTEMS

COURSE DESCRIPTION

This course is designed to build on previous courses so the student can apply principles and applications of physical science, design, and safety to a project-based learning environment. Learning activities include creating and following plans, project construction, and problem solving. Classroom and laboratory activities are supplemented through, supervised agricultural experiences, and FFA leadership programs & activities.

STANDARDS AND INDICATORS:

AFNR.HS.1.1 Utilize physical science and engineering principles to design and implement and improve safe and efficient mechanical systems in AFNR situations.

AFNR.HS.1.1.a	Compare and contrast applications of simple machines in AFNR-related mechanical systems.
AFNR.HS.1.1.b	Determine appropriate tools, machines, and equipment needed to construct and/or fabricate a project in AFNR.
AFNR.HS.1.1.c	Classify the types of safety hazards associated with different mechanical systems used in AFNR (e.g., caution, warning, danger).
AFNR.HS.1.1.d	Apply mathematical calculations to determine the mechanical advantage of simple machines in AFNR-related mechanical systems.
AFNR.HS.1.1.e	Calculate the maintenance and purchase cost of tools, machines, and equipment used in AFNR.
AFNR.HS.1.1.f	Apply the scientific method to devise strategies to improve the efficiency of operation of AFNR-related mechanical systems.
AFNR.HS.1.1.g	Devise processes to safely implement and evaluate the safe use of AFNR-related tools, machinery, and equipment.

ADVANCED POWER, STRUCTURAL, AND TECHNOLOGY SYSTEMS (cont.)

AFNR.HS.1.2 Evaluate structural requirements and specifications and estimate costs for structures within Agriculture Food and Natural Resources.

AFNR.HS.1.2.a Summarize information needed to complete a bill of materials and cost estimate for an AFNR structure.

AFNR.HS.1.2.b Summarize sources of industry construction and materials standards and their importance (e.g., American National Standards Institute, ANSI, Underwriters' Laboratories, UL).

AFNR.HS.1.2.c Assess local building code requirements for agricultural structures.

AFNR.HS.1.2.d Create a project cost estimate including materials, labor, and management for an AFNR structure.

AFNR.HS.1.2.e Design a building functionality and safety assessment on an agricultural structure using knowledge of industry standards and local code requirements.

AFNR.HS.1.3 Utilize architectural and mechanical plans to construct, maintain and/or repair AFNR structures (e.g., material selection, site preparation, and/or layout, plumbing, concrete/ masonry, brick/stone).

AFNR.HS.1.3.a Examine the criteria in selecting materials for constructing, maintaining, and/or repairing AFNR structures.

AFNR.HS.1.3.b Compare and contrast the characteristics of products used in constructing AFNR structures (e.g., copper, PVC, PEX, fencing).

AFNR.HS.1.3.c Summarize the characteristics of the components found in concrete.

AFNR.HS.1.3.d Assess samples of materials or products for quality and efficiency of workmanship.

AFNR.HS.1.3.e Complete a building-site-analysis checklist to select an ideal building site.

AFNR.HS.1.3.f Measure and calculate the cost of a project (e.g., fencing, metal/wood structures, concrete projects).

AFNR.HS.1.3.g Select materials for a project based upon an analysis of the project and the quality of the materials.

AFNR.HS.1.3.h Identify processes in the construction, maintenance, and/or repair of fencing (e.g., wood, static wire, electrical wire, and other fencing materials) and AFNR structures.

AFNR.HS.1.3.i Calculate costs to insulate a structure and estimate reduced BTU loss.

ADVANCED POWER, STRUCTURAL, AND TECHNOLOGY SYSTEMS (cont.)

AFNR.HS.1.4 Evaluate concepts of electrical drawings to design, install and troubleshoot electronic control systems in AFNR settings.

AFNR.HS.1.4.a	Examine electrical control system components used in AFNR systems (e.g., transistors, relays, HVAC, logic controllers).
AFNR.HS.1.4.b	Compare and contrast electrical sensors and controls used in AFNR power, structural, and technical systems.
AFNR.HS.1.4.c	Summarize the importance of AFNR power, structural, and technical control systems using programmable logic controllers (PLC) and/or other computer-based systems.
AFNR.HS.1.4.d	Interpret schematic drawings for electrical control systems used in AFNR systems.
AFNR.HS.1.4.e	Interpret maintenance schedules for electrical control systems used in AFNR power, structural, and technical systems.
AFNR.HS.1.4.f	Assess the functions of AFNR power, structural, and technical control systems using programmable logic controllers (PLC) in agricultural production and manufacturing.
AFNR.HS.1.4.g	Design schematic drawings for electrical control systems used in AFNR systems.
AFNR.HS.1.4.h	Troubleshoot electrical control system performance problems found in AFNR power, structural, and technical systems.
AFNR.HS.1.4.i	Develop AFNR power, structural, and technical control systems using program mable logic controllers (PLC) and/or other computer-based systems.

AGRICULTURE, FOOD, NATURAL RESOURCES LEADERSHIP, AND CAREER READINESS WITH WORK-BASED LEARNING

COURSE DESCRIPTION

This course will provide students with fundamental skills for success in agricultural careers and team environments. Students will investigate a variety of topics essential to career exploration and readiness in Agriculture, Food, and Natural Resources. In addition, students will develop skills in ethical leadership, communications, and teamwork. Classroom and laboratory Classroom and laboratory activities are supplemented through supervised agricultural experiences and FFA leadership programs and activities.

STANDARDS AND INDICATORS:

AFNR.HS.10.1 Evaluate career opportunities and means to achieve those opportunities in each of the AFNR career pathways.

AFNR.HS.10.1.a	Demonstrate personal responsibility in the workplace and community.
AFNR.HS.10.1.b	Demonstrate career readiness skills for career success.
AFNR.HS.10.1.c	Evaluate the steps and requirements to pursue a career opportunity in an AFNR career pathway.
AFNR.HS.10.1.d	Apply appropriate academic and technical skills to demonstrate career success.
AFNR.HS.10.1.e	Examine career opportunities that are matched to personal life skills and talents and career goals in an AFNR pathway of interest.

AFNR.HS.10.2 Develop employability skills for college and career readiness within AFNR.

AFNR.HS.10.2.a	Model personal responsibility and demonstrate safety in the workplace and community.
AFNR.HS.10.2.b	Synthesize information, knowledge, and experience to generate original ideas and challenge assumptions in the workplace and community.
AFNR.HS.10.2.c	Apply reason and logic to evaluate workplace and community situations from multiple perspectives.
AFNR.HS.10.2.d	Investigate, prioritize, and select solutions to solve problems in the workplace community.
AFNR.HS.10.2.e	Contribute to team-oriented projects and build consensus to accomplish results using cultural global competence in the workplace and community.
AFNR.HS.10.2.f	Identify and demonstrate personal financial management and planning.

AGRICULTURE, FOOD, NATURAL RESOURCES LEADERSHIP, AND CAREER READINESS WITH WORK-BASED LEARNING (cont.)

AFNR.HS.10.3 Model teamwork and leadership skills in work groups.

AFNR.HS.10.3.a Employ cooperative leadership skills to accomplish a team goal.

AFNR.HS.10.3.b Model proper management of teams and large groups.

AFNR.HS.10.3.c Contribute to team-oriented projects to accomplish results using cultural global competence in the workplace and community.

AFNR.HS.10.4 Model integrity, ethical leadership, and effective management in AFNR career areas.

AFNR.HS.10.4.a Model characteristics of ethical and effective leaders in the workplace and community.

AFNR.HS.10.4.b Implement personal management skills to function effectively and efficiently in the workplace.

AFNR.HS.10.4.c Demonstrate workplace characteristics that contribute to a positive morale and workplace environment.

AFNR.HS.10.4.d Demonstrate ethical decision-making in real-life situations in agriculture, food, and natural resources.

AFNR.HS.10.5 Communicate information relevant to agriculture clearly, effectively, and with reason.

AFNR.HS.10.5.a Demonstrate basic information research skills and techniques.

AFNR.HS.10.5.b Produce clear, reasoned, and coherently produced, verbal, or visual communication for formal or informal settings.

AFNR.HS.10.5.c Communicate using strategies that ensure clarity, logic, purpose, and professionalism in formal or informal settings.

AFNR.HS.10.5.d Utilize new technologies, tools, and applications to maximize productivity and minimize risk in the workplace and community.

INTRODUCTION TO AGRICULTURE, FOOD, AND NATURAL RESOURCES

COURSE DESCRIPTION

The introductory course for the Agriculture, Food, and Natural Resources Career Cluster provides a knowledge base in the major components of the industry. Learners will be exposed to a broad range of agriculture, food, and natural resources careers, cluster foundation knowledge and skills, and introduction to leadership development and the National FFA Organization (FFA). Classroom and laboratory activities are supplemented through supervised agricultural experiences, career exploration activities, and FFA leadership programs & activities.

STANDARDS AND INDICATORS:

AFNR.HS.20.1 Apply leadership skills and knowledge through the study of the FFA Career and Technical Student Organization (CTSO).

AFNR.HS.20.1.a	Summarize the three-component model of a comprehensive Agricultural Education Program.
AFNR.HS.20.1.b	Recognize the mission, purpose, and key historical moments in the National FFA Organization.
AFNR.HS.20.1.c	Investigate opportunities available for a member of FFA.
AFNR.HS.20.1.d	Examine and practice public speaking.
AFNR.HS.20.1.e	Apply the basics of Parliamentary Procedure.

AFNR.HS.20.2 Apply career readiness principles in an authentic workplace environment.

AFNR.HS.20.2.a	Summarize the five components of a Foundational Supervised Agricultural Experience (SAE).
AFNR.HS.20.2.b	Investigate the five options for an Immersion SAE.
AFNR.HS.20.2.c	Articulate elements of career plans (e.g., academic, AFNR/CTE coursework, FFA/CTSO participation, immersion SAE) required in an AFNR workplace setting.

INTRODUCTION TO AGRICULTURE, FOOD, AND NATURAL RESOURCES (cont.)

AFNR.HS.20.3 Examine career options within agriculture, food, and natural resource systems and perform research based on personal interests.

AFNR.HS.20.3.a	Inventory personal work preferences and interests related to the AFNR Career Field.
AFNR.HS.20.3.b	Identify careers available in multiple AFNR Career Pathways.
AFNR.HS.20.3.c	Determine common qualities of a specific career area (e.g., educational requirements, work environment).
AFNR.HS.20.3.d	Identify necessary steps to prepare for a specific AFNR careers (coursework, post-secondary, needed skills).
AFNR.HS.20.3.e	Identify opportunities for work placed learning within your community.

AFNR.HS.20.4 Evaluate the role of water, air, soil, and habitat in the management of natural resource systems.

AFNR.HS.20.4.a	Summarize and classify the different natural resources (e.g., water, soil, renewable, non-renewable).
AFNR.HS.20.4.b	Summarize the components that comprise all ecosystems.
AFNR.HS.20.4.c	Compare and categorize biotic and abiotic factors in various habitats.
AFNR.HS.20.4.d	Identify the importance of water and air quality.
AFNR.HS.20.4.e	Identify the physical qualities of the soil that determine use for the environmental service system.
AFNR.HS.20.4.f	Describe the importance of water conservation.

INTRODUCTION TO AGRICULTURE, FOOD, AND NATURAL RESOURCES (cont.)

AFNR.HS.20.5 Differentiate key terms, components, and uses for animals in animal systems.

AFNR.HS.20.5.a Identify and summarize key terminology used in animal systems (e.g., heifer vs. cow, bull vs. steer, calving, farrowing, bovine, equine).

AFNR.HS.20.5.b Define the function of basic external and internal organs of animals.

AFNR.HS.20.5.c Differentiate production animals from companion animals.

AFNR.HS.20.5.d Classify the major components of production animal systems (e.g., feedlots, cow-calf operations, farrow, finish) and regional distribution.

AFNR.HS.20.5.e Categorize uses for and products generated from production animals.

AFNR.HS.20.5.f Classify and determine uses for companion animals.

AFNR.HS.20.6 Summarize knowledge of plant anatomy and the functions of plant structures and processes to activities associated with plant systems.

AFNR.HS.20.6.a Classify major components of the plant industry.

AFNR.HS.20.6.b Classify plants according to life cycles.

AFNR.HS.20.6.c Identify the function of plant parts.

AFNR.HS.20.6.d Identify basic processes and role of photosynthesis, respiration, and transpiration.

AFNR.HS.20.6.e Differentiate between sexual and asexual propagation techniques.

AFNR.HS.20.7 Synthesize the historical, social, cultural, and potential applications of biotechnology.

AFNR.HS.20.7.a Summarize biotechnology and the historical impact it has had on agriculture.

AFNR.HS.20.7.b Identify current and future applications of biotechnology in agriculture, food, and natural resources.

AFNR.HS.20.7.c Identify common methodologies used in biotechnology.

AFNR.HS.20.7.d Identify basic cellular structures and genetic terminology.

AFNR.HS.20.7.e Summarize the scientific and social implications of modern genetically modified organisms.

INTRODUCTION TO AGRICULTURE, FOOD, AND NATURAL RESOURCES (cont.)

AFNR.HS.20.8 Summarize knowledge of the food products & processing industry.

AFNR.HS.20.8.a Evaluate how different foods affect the human body and its physical and cellular processes.

AFNR.HS.20.8.b Identify food safety and sanitation procedures for handling and processing to as sure food quality.

AFNR.HS.20.8.c Summarize food safety procedures when storing and distributing products to consumption.

AFNR.HS.20.8.d Explain the producer-to-consumer processes in the food industry.

AFNR.HS.20.9 Summarize management principles, skills, and practices in agribusiness.

AFNR.HS.20.9.a Define major sectors within the agribusiness industry.

AFNR.HS.20.9.b Identify standard production and agribusiness records and plans.

AFNR.HS.20.9.c Identify common agribusiness terminology and tools to track and analyze business decisions and transactions.

AFNR.HS.20.9.d Articulate the role of markets, trade, competition, and price in relation to business sales and market planning.

AFNR.HS.20.9.e Identify aspects needed to develop and implement an effective record keeping strategy for financial and human resources.

AFNR.HS.20.10 Synthesize the historical, social, cultural, and potential applications of biotechnology.

AFNR.HS.20.10.a Identify and practice safe laboratory practices and procedures.

AFNR.HS.20.10.b Select and operate proper tools and equipment related to agricultural processes observing all safety precautions.

AFNR.HS.20.10.c Develop an agricultural project plan with the required project plan components (e.g., purpose, materials, budget, skills required, timeframe).

AFNR.HS.20.10.d Assess a project plan to completion.

AGRICULTURAL BUSINESS

COURSE DESCRIPTION

This course covers skills necessary for entry into employment or furthering education in an agricultural business. The course includes the study of business planning, creating financial documents, analyzing financial information, developing business plans, and using sales and marketing principles. Classroom and laboratory activities are supplemented through supervised agricultural experiences and FFA leadership programs & activities.

STANDARDS AND INDICATORS:

AFNR.HS.3.1 Summarize the history of agricultural businesses in relation to current trends.

AFNR.HS.3.1.a Identify historical changes and current trends in ag businesses.

AFNR.HS.3.1.b Explain the importance and variety of current global agricultural markets.

AFNR.HS.3.1.c Summarize the role of the major sectors of ag businesses, which include supply and inputs, production, processing/manufacturing, transportation, and marketing.

AFNR.HS.3.2 Analyze agricultural business structures and principles of business management.

AFNR.HS.3.2.a Differentiate business structures commonly found in agricultural businesses such as cooperatives, corporations, limited liability corporations, and sole proprietorship.

AFNR.HS.3.2.b Summarize the principles of business structures.

AFNR.HS.3.2.c Identify government policies within agricultural business structures.

AFNR.HS.3.3 Design statements of purpose to guide agricultural business goals, objectives, and resource allocation.

AFNR.HS.3.3.a Identify the need for statements of purpose within agricultural businesses, such as mission statements, vision statements, and/or long and short-term goals.

AFNR.HS.3.3.b Classify multiple business objectives within a typical production cycle for an agricultural business.

AFNR.HS.3.3.c Identify aspects needed in creating statements of purpose for an agricultural business.

AFNR.HS.3.3.d Determine the appropriate utilization of available resources to meet a business's statement of purpose.

AGRICULTURAL BUSINESS (cont.)

AFNR.HS.3.4 Apply concepts of record keeping to accomplish objectives and manage an established budget within an agricultural business.

AFNR.HS.3.4.a Define the purpose of record-keeping within an agricultural business and identify examples of tools and methods of record-keeping.

AFNR.HS.3.4.b Compare and contrast the benefits and limitations of record-keeping systems and practices.

AFNR.HS.3.4.c Identify the components of records in an agricultural business (e.g., assets, liabilities, debits, credits, and equity.)

AFNR.HS.3.4.d Explain input and output combinations within agricultural business records.

AFNR.HS.3.4.e Identify aspects of a budget for an agricultural business.

AFNR.HS.3.5 Analyze financial information and reports to examine appropriate decision-making in an agricultural business.

AFNR.HS.3.5.a Calculate balance sheets, income statements, net worth statements, return-on-investment ratios, and inventory statements.

AFNR.HS.3.5.b Define and analyze cash flow statements and cash flow budgets.

AFNR.HS.3.5.c Utilize financial information (e.g., financial ratios, net worth, profitability) to evaluate the performance of agricultural businesses.

AFNR.HS.3.5.d Summarize sources of risk and methods of managing risk in agricultural businesses.

AFNR.HS.3.5e Explain common methods to acquire capital (e.g., lines of credit, loans, operating notes.)

AFNR.HS.3.6 Compare various marketing strategies for agricultural businesses.

AFNR.HS.3.6.a Analyze a marketing plan and key elements of marketing (e.g., product, place, price, and promotion).

AFNR.HS.3.6.b Classify traditional marketing strategies for agricultural commodities.

AFNR.HS.3.6.c Identify innovative, non-traditional marketing strategies for agricultural commodities.

AGRICULTURAL BUSINESS (cont.)

AFNR.HS.3.7 Investigate commodity markets and strategies to manage markets for agricultural commodities.

AFNR.HS.3.7.a Describe the history of commodity markets and their structure in today's society.

AFNR.HS.3.7.b Summarize trading in the futures markets utilizing speculation and hedging.

AFNR.HS.3.7.c Distinguish between cash markets for commodities and commodity marketing plans for producers (e.g., cash prices, basis, forward contracts, futures contracts).

AFNR.HS.3.7.d Identify patterns in ag commodity markets.

AFNR.HS.3.8 Evaluate necessary aspects of a business plan for an agricultural business.

AFNR.HS.3.8.a Identify the components of a business plan for an agricultural business.

AFNR.HS.3.8.b Determine the characteristics of successful business plans.

AFNR.HS.3.8.c Formulate a business plan for an agricultural business utilizing the key concepts of business planning.

AGRICULTURAL SALES

COURSE DESCRIPTION

This course covers the skills necessary to market agricultural products, including the development of effective communication skills. The course applies sales strategies and marketing principles to agricultural products and services. Classroom and laboratory activities are supplemented through supervised agricultural experiences and FFA leadership programs & activities.

STANDARDS AND INDICATORS:

AFNR.HS.7.1 Assess the psychology behind sales and professional selling.

- AFNR.HS.7.1.a Identify professional sales techniques.
- AFNR.HS.7.1.b Recognize the psychology of selling agricultural products and the relationship of those products to the general population.
- AFNR.HS.7.1.c Classify the key concepts of sales.

AFNR.HS.7.2 Summarize concepts of sales techniques used in agricultural businesses.

- AFNR.HS.7.2.a Recall the product life cycle for typical agricultural products.
- AFNR.HS.7.2.b Explain the concept of supply and demand, and its relationship to sales.
- AFNR.HS.7.2.c Categorize customer needs and wants.

AFNR.HS.7.3 Analyze the sales process.

- AFNR.HS.7.3.a Identify agricultural sales skills.
- AFNR.HS.7.3.b Identify the appropriate steps to selling an agricultural product.
- AFNR.HS.7.3.c Design a sales presentation.
- AFNR.HS.7.3.d Critique closing techniques within the sales process.

AGRICULTURAL SALES (cont.)

AFNR.HS.7.4 Explain the significance of customer relationships in the selling process.

AFNR.HS.7.4.a Describe the benefits of positive customer relationships and the aspects of customer satisfaction.

AFNR.HS.7.4.b Identify methods of building and maintaining positive customer relationships.

AFNR.HS.7.4.c Demonstrate solutions for handling customer resistance and/or negative reactions.

AFNR.HS.7.5 Critique various marketing strategies for agricultural businesses.

AFNR.HS.7.5.a Describe the role of trade and price in marketing agricultural commodities.

AFNR.HS.7.5.b Analyze a marketing plan and the key elements of marketing (e.g., product, place, price, and promotion).

AFNR.HS.7.5.c Compare traditional marketing strategies for agricultural products.

AFNR.HS.7.5.d Identify innovative, non-traditional marketing strategies for agricultural products.

AFNR.HS.7.6 Analyze the key concepts in a sales portfolio for agricultural communications.

AFNR.HS.7.6.a Define the creative strategy in developing a sales portfolio.

AFNR.HS.7.6.b Draw conclusions regarding successful agricultural sales portfolios and presentations.

AFNR.HS.7.6.c Distinguish available technology aspects found within a sales portfolio or utilized during sales communications.

AFNR.HS.7.6.d Develop a comprehensive marketing plan presentation utilizing a sales portfolio and a variety of communications strategies.

AGRICULTURAL COMMUNICATION

COURSE DESCRIPTION

This course focuses on identifying current issues affecting the agricultural industry and communicating about those issues effectively. This course concentrates onprint, digital, and broadcast media within the agricultural industry. Students will learn various types of communications methods such as speech writing, photography, presentations, marketing, and debate. By the end of the course, students will demonstrate competency of agricultural communications and methods of effective presentation within the agricultural sector. Classroom and laboratory activities are supplemented through supervised agricultural experiences, and FFA leadership programs & activities.

STANDARDS AND INDICATORS:

AFNR.HS.4.1 Compare and contrast effective communication techniques in agricultural issues and literacy topics.

AFNR.HS.4.1.a Identify trending issues in historical and modern United States agriculture.

AFNR.HS.4.1.b Classify and compare agricultural communication strategies of goals, target audience, key messages, and producer scenarios.

AFNR.HS.4.1.c Classify methods of communication (e.g., verbal, non-verbal, written, visual).

AFNR.HS.4.2 Demonstrate journalistic writing communication techniques.

AFNR.HS.4.2.a Identify and critique standard rules of grammar, spelling, punctuation, and formatting for news writing.

AFNR.HS.4.2.b Compare and contrast the different types of journalistic writing (e.g., feature story, news release, opinionated).

AFNR.HS.4.2.c Analyze the steps in developing and formatting an effective news story.

AFNR.HS.4.2.d Develop an agricultural news story using accepted strategies (e.g., inverted pyramid, interpretive journalism).

AGRICULTURAL COMMUNICATION (cont.)

AFNR.HS.4.3 Analyze the utilization of graphics as methods of marketing and communicating with clients/customers.

AFNR.HS.4.3.a Compare and contrast the elements of photography (e.g., line, shape, form, texture, pattern, color, space).

AFNR.HS.4.3.b Identify the key elements of magazine advertisement and understand how they are used to enhance an ad's effectiveness.

AFNR.HS.4.3.c Indicate aspects of an effective logo for an agricultural business.

AFNR.HS.4.3.d Utilize graphics as a part of an effective merchandising and advertising plan.

AFNR.HS.4.4 Apply concepts of broadcasting media to agricultural communications.

AFNR.HS.4.4.a Summarize effective communications practices applying to agriculture in the radio communications sector.

AFNR.HS.4.4.b Examine the changes in television communications and the influence it has on the agricultural sector.

AFNR.HS.4.4.c Identify and practice current trends in agricultural podcasting.

AFNR.HS.4.5 Summarize current trends in agricultural communications utilizing online media.

AFNR.HS.4.5.a Compare and contrast social media outlets and identify successful methods of communications utilizing each method.

AFNR.HS.4.5.b Explain key elements of design for online media platforms.

AFNR.HS.4.5.c Explore the methods used in online advertising and summarize processes in designing an online advertisement.

AGRICULTURAL COMMUNICATION (cont.)

AFNR.HS.4.6 Exhibit professional public speaking practices.

AFNR.HS.4.6.a	Define specific speaking techniques as deemed effective in the agricultural industry.
AFNR.HS.4.6.b	Use concepts of public speaking to demonstrate proper agricultural-based public speaking methods.
AFNR.HS.4.6.c	Display competency in agriculture literacy through various agricultural topics.
AFNR.HS.4.6.d	Develop logical arguments to exhibit understanding of agriculture in a debate setting.

AFNR.HS.4.7 Analyze and develop communication methods of a media plan.

AFNR.HS.4.7.a	Explain the steps in selecting a client or situation and effectively identifying their needs.
AFNR.HS.4.7.b	Identify the successful elements of a media plan.
AFNR.HS.4.7.c	Analyze media plans for effective communication methods.
AFNR.HS.4.7.d	Demonstrate concepts of an effective presentation to communicate key points of a media plan.

AGRICULTURAL ECONOMICS

COURSE DESCRIPTION

This course covers economic principles that drive agricultural businesses. The course studies both micro- and macroeconomic principles, production, distribution, pricing, and consumption of agricultural products and the allocation of agricultural resources. Classroom and laboratory activities are supplemented through supervised agricultural experiences and FFA leadership programs & activities.

STANDARDS AND INDICATORS:

AFNR.HS.5.1 Analyze the connection between economic principles and the overall economy at the local, state, national, and global levels.

AFNR.HS.5.1.a Describe agricultural economics and the foundational concepts of micro- and macroeconomics.

AFNR.HS.5.1.b Describe the differences and similarities between micro- and macroeconomics.

AFNR.HS.5.1.c Recognize the impact of governments on economic policies and Practices related to Agriculture, Food and Natural Resources (AFNR).

AFNR.HS.5.1.d Investigate the relationship between various cultural traditions and local, state, national, and global agricultural economies.

AFNR.HS.5.2 Analyze the relationship between micro- and macroeconomics.

AFNR.HS.5.2.a List the production functions within micro- and macroeconomic systems.

AFNR.HS.5.2.b Distinguish labor and capital inputs in agricultural economics.

AFNR.HS.5.2.c Analyze the impact of governmental agencies on agricultural economics through trade policies, production programs, and other opportunities such as low-interest loans, educational programs, and other types of support.

AFNR.HS.5.2.d Describe gross domestic product (GDP).

AGRICULTURAL ECONOMICS (cont.)

AFNR.HS.5.3 Evaluate economic systems and their impact on supply and demand, markets, and production cycles.

AFNR.HS.5.3.a Describe the traditional economy and its place in modern economies.

AFNR.HS.5.3.b Explain the command economy and its benefits and drawbacks within the agricultural economy.

AFNR.HS.5.3.c Define the market economy and its key features.

AFNR.HS.5.3.d Identify a mixed economy and its advantages and disadvantages.

AFNR.HS.5.4 Critique the process of price determination in a competitive market.

AFNR.HS.5.4.a State the influence of supply and demand concepts in marketing, trading, and price determination.

AFNR.HS.5.4.b Identify the importance of utility and price elasticity in agricultural production cycles.

AFNR.HS.5.4.c Relate the influence of supply and demand shifts to the production and pricing of agricultural commodities.

AFNR.HS.5.5 Interpret US agricultural trade policies and exchange rates.

AFNR.HS.5.5.a Identify agricultural trade and measure its growth, instability, and future trends.

AFNR.HS.5.5.b Describe trade restrictions and impact of trade agreements on US agriculture.

AFNR.HS.5.5.c Determine the impact of the exchange rates to determine the impact of agricultural trade on the GDP.

AGRICULTURAL ENTREPRENEURSHIP

COURSE DESCRIPTION

This course covers skills necessary for students to analyze and establish entrepreneurial businesses. The course includes the study of personal and business financial planning, obtaining capital and credit, repaying loans, analyzing financial information, decision-making, developing business plans, and applying sales and marketing principles. Classroom and laboratory activities are supplemented through supervised agricultural experiences and FFA leadership programs & activities.

STANDARDS AND INDICATORS:

AFNR.HS.6.1 Analyze principles of entrepreneurship and its role in the agricultural business sector.

AFNR.HS.6.1.a	Identify the key components of entrepreneurship (e.g., opportunity, resources, organization).
AFNR.HS.6.1.b	Compare the characteristics of entrepreneur in agribusinesses and a manager and/or employee.
AFNR.HS.6.1.c	Summarize techniques used to manage an agricultural business.
AFNR.HS.6.1.d	Explain concept of risk within a business and methods of risk management.

AFNR.HS.6.2 Apply key concepts of personal finance in relation to an entrepreneurial role.

AFNR.HS.6.2.a	Describe the information included in a credit report and the factors that influence a credit score.
AFNR.HS.6.2.b	Identify trends in spending habits using personal and business budgets and balance sheets.
AFNR.HS.6.2.c	Identify assets, liabilities, collateral, and inventory items that are used by entrepreneurs in agricultural businesses.
AFNR.HS.6.2.d	Evaluate options in personal and business finances to improve financial standing and security.

AGRICULTURAL ENTREPRENEURSHIP (cont.)

AFNR.HS.6.3 Summarize the benefits and risks of obtaining business financing as an entrepreneur.

AFNR.HS.6.3.a Compare types of financing available to an entrepreneur and methods of obtaining them from various lenders (e.g., private financers, government programs, grants.)

AFNR.HS.6.3.b Identify options to repay financing while operating as an entrepreneur.

AFNR.HS.6.3.c Calculate interest rates and tabulate the possible cost savings for a business utilizing different repayment schedules.

AFNR.HS.6.3.d Investigate the most logical financing and repayment options for an individual entrepreneur.

AFNR.HS.6.4 Differentiate between tax strategies and resources (such as government agencies and private programs) available to assist beginning and experienced entrepreneurs in agriculture businesses.

AFNR.HS.6.4.a Identify tax strategies available to business owners to decrease the tax burden.

AFNR.HS.6.4.b Identify programs and identify governmental regulations related to a specific AFNR-related business available to entrepreneurs through government agencies or private institutions.

AFNR.HS.6.4.c Identify government resources and organizations that will help navigate regulations in following guidelines (e.g., opening a farmers' market and following rules and regulations).

AFNR.HS.6.4.d Compare and contrast the advantages and disadvantages of selecting specific courses of action utilizing available resources.

AGRICULTURAL ENTREPRENEURSHIP (cont.)

AFNR.HS.6.5 Analyze break-even points in agricultural businesses.

AFNR.HS.6.5.a Utilize income statements to establish cash flow statements.

AFNR.HS.6.5.b Calculate break-even points for agricultural businesses (e.g., crop-based, livestock-based, service-based, diversified).

AFNR.HS.6.5.c Estimate the cost or cost-savings of purchasing, leasing, renting, and/or otherwise obtaining resources for an agricultural business based on break-even points.

AFNR.HS.6.6 Apply entrepreneurial business and marketing principles for agricultural products, services and businesses.

AFNR.HS.6.6.a Create a new product/business using entrepreneurial skills and financial planning documentation.

AFNR.HS.6.6.b Identify the key concepts of a successful launch for a traditional or non-traditional agricultural product/service or business.

AFNR.HS.6.6.c Identify marketing strategies used to capture consumer interest and the factors of selling agricultural products/services.

AFNR.HS.6.6.d Utilize technology for record-keeping and other financial transactions/plans for an agricultural business.

AGRICULTURE, FOOD, NATURAL RESOURCES LEADERSHIP, AND CAREER READINESS WITH WORK-BASED LEARNING

COURSE DESCRIPTION

This course will provide students with fundamental skills for success in agricultural careers and team environments. Students will investigate a variety of topics essential to career exploration and readiness in Agriculture, Food, and Natural Resources. In addition, students will develop skills in ethical leadership, communications, and teamwork. Classroom and laboratory activities are supplemented through supervised agricultural experiences and FFA leadership programs and activities.

STANDARDS AND INDICATORS:

AFNR.HS.10.1 Evaluate career opportunities and means to achieve those opportunities in each of the AFNR career pathways.

AFNR.HS.10.1.a	Demonstrate personal responsibility in the workplace and community.
AFNR.HS.10.1.b	Demonstrate career readiness skills for career success.
AFNR.HS.10.1.c	Evaluate the steps and requirements to pursue a career opportunity in an AFNR career pathway.
AFNR.HS.10.1.d	Apply appropriate academic and technical skills to demonstrate career success.
AFNR.HS.10.1.e	Examine career opportunities that are matched to personal life skills and talents and career goals in an AFNR pathway of interest.

AFNR.HS.10.2 Develop employability skills for college and career readiness within AFNR.

AFNR.HS.10.2.a	Model personal responsibility and demonstrate safety in the workplace and community.
AFNR.HS.10.2.b	Synthesize information, knowledge, and experience to generate original ideas and challenge assumptions in the workplace and community.
AFNR.HS.10.2.c	Apply reason and logic to evaluate workplace and community situations from multiple perspectives.
AFNR.HS.10.2.d	Investigate, prioritize, and select solutions to solve problems in the workplace community.
AFNR.HS.10.2.e	Contribute to team-oriented projects and build consensus to accomplish results using cultural global competence in the workplace and community.
AFNR.HS.10.2.f	Identify and demonstrate personal financial management and planning.

AGRICULTURE, FOOD, NATURAL RESOURCES LEADERSHIP, AND CAREER READINESS WITH WORK-BASED LEARNING (cont.)

AFNR.HS.10.3 Model teamwork and leadership skills in work groups.

AFNR.HS.10.3.a Employ cooperative leadership skills to accomplish a team goal.

AFNR.HS.10.3.b Model proper management of teams and large groups.

AFNR.HS.10.3.c Contribute to team-oriented projects to accomplish results using cultural global competence in the workplace and community.

AFNR.HS.10.4 Model integrity, ethical leadership, and effective management in AFNR career areas.

AFNR.HS.10.4.a Model characteristics of ethical and effective leaders in the workplace and community.

AFNR.HS.10.4.b Implement personal management skills to function effectively and efficiently in the workplace.

AFNR.HS.10.4.c Demonstrate workplace characteristics that contribute to a positive morale and workplace environment.

AFNR.HS.10.4.d Demonstrate ethical decision-making in real-life situations in agriculture, food, and natural resources.

AFNR.HS.10.5 Communicate information relevant to agriculture clearly, effectively, and with reason.

AFNR.HS.10.5.a Demonstrate basic information research skills and techniques.

AFNR.HS.10.5.b Produce clear, reasoned, and coherently produced, verbal, or visual communication for formal or informal settings.

AFNR.HS.10.5.c Communicate using strategies that ensure clarity, logic, purpose, and professionalism in formal or informal settings.

AFNR.HS.10.5.d Utilize new technologies, tools, and applications to maximize productivity and minimize risk in the workplace and community.

INTRODUCTION TO AGRICULTURE, FOOD, AND NATURAL RESOURCES

COURSE DESCRIPTION

The introductory course for the Agriculture, Food, and Natural Resources Career Cluster provides a knowledge base in the major components of the industry. Learners will be exposed to a broad range of agriculture, food, and natural resources careers, cluster foundation knowledge and skills, and introduction to leadership development and the National FFA Organization (FFA). Classroom and laboratory activities are supplemented through supervised agricultural experiences, career exploration activities, and FFA leadership programs & activities.

STANDARDS AND INDICATORS:

AFNR.HS.20.1 Apply leadership skills and knowledge through the study of the FFA Career and Technical Student Organization (CTSO).

AFNR.HS.20.1.a	Summarize the three-component model of a comprehensive Agricultural Education Program.
AFNR.HS.20.1.b	Recognize the mission, purpose, and key historical moments in the National FFA Organization.
AFNR.HS.20.1.c	Investigate opportunities available for a member of FFA.
AFNR.HS.20.1.d	Examine and practice public speaking.
AFNR.HS.20.1.e	Apply the basics of Parliamentary Procedure.

AFNR.HS.20.2 Apply career readiness principles in an authentic workplace environment.

AFNR.HS.20.2.a	Summarize the five components of a Foundational Supervised Agricultural Experience (SAE).
AFNR.HS.20.2.b	Investigate the five options for an Immersion SAE.
AFNR.HS.20.2.c	Articulate elements of career plans (e.g., academic, AFNR/CTE coursework, FFA/CTSO participation, immersion SAE) required in an AFNR workplace setting.

INTRODUCTION TO AGRICULTURE, FOOD, AND NATURAL RESOURCES (cont.)

AFNR.HS.20.3 Examine career options within agriculture, food, and natural resource systems and perform research based on personal interests.

AFNR.HS.20.3.a	Inventory personal work preferences and interests related to the AFNR Career Field.
AFNR.HS.20.3.b	Identify careers available in multiple AFNR Career Pathways.
AFNR.HS.20.3.c	Determine common qualities of a specific career area (e.g., educational requirements, work environment).
AFNR.HS.20.3.d	Identify necessary steps to prepare for a specific AFNR careers (coursework, post-secondary, needed skills).
AFNR.HS.20.3.e	Identify opportunities for work placed learning within your community.

AFNR.HS.20.4 Evaluate the role of water, air, soil, and habitat in the management of natural resource systems.

AFNR.HS.20.4.a	Summarize and classify the different natural resources (e.g., water, soil, renewable, non-renewable).
AFNR.HS.20.4.b	Summarize the components that comprise all ecosystems.
AFNR.HS.20.4.c	Compare and categorize biotic and abiotic factors in various habitats.
AFNR.HS.20.4.d	Identify the importance of water and air quality.
AFNR.HS.20.4.e	Identify the physical qualities of the soil that determine use for the environmental service system.
AFNR.HS.20.4.f	Describe the importance of water conservation.

INTRODUCTION TO AGRICULTURE, FOOD, AND NATURAL RESOURCES (cont.)

AFNR.HS.20.5 Differentiate key terms, components, and uses for animals in animal systems.

AFNR.HS.20.5.a	Identify and summarize key terminology used in animal systems (e.g., heifer vs. cow, bull vs. steer, calving, farrowing, bovine, equine).
AFNR.HS.20.5.b	Define the function of basic external and internal organs of animals.
AFNR.HS.20.5.c	Differentiate production animals from companion animals.
AFNR.HS.20.5.d	Classify the major components of production animal systems (e.g., feedlots, cow-calf operations, farrow, finish) and regional distribution.
AFNR.HS.20.5.e	Categorize uses for and products generated from production animals.
AFNR.HS.20.5.f	Classify and determine uses for companion animals.

AFNR.HS.20.6 Summarize knowledge of plant anatomy and the functions of plant structures and processes to activities associated with plant systems.

AFNR.HS.20.6.a	Classify major components of the plant industry.
AFNR.HS.20.6.b	Classify plants according to life cycles.
AFNR.HS.20.6.c	Identify the function of plant parts.
AFNR.HS.20.6.d	Identify basic processes and role of photosynthesis, respiration, and transpiration.
AFNR.HS.20.6.e	Differentiate between sexual and asexual propagation techniques.

AFNR.HS.20.7 Synthesize the historical, social, cultural, and potential applications of biotechnology.

AFNR.HS.20.7.a	Summarize biotechnology and the historical impact it has had on agriculture.
AFNR.HS.20.7.b	Identify current and future applications of biotechnology in agriculture, food, and natural resources.
AFNR.HS.20.7.c	Identify common methodologies used in biotechnology.
AFNR.HS.20.7.d	Identify basic cellular structures and genetic terminology.
AFNR.HS.20.7.e	Summarize the scientific and social implications of modern genetically modified organisms.

INTRODUCTION TO AGRICULTURE, FOOD, AND NATURAL RESOURCES (cont.)

AFNR.HS.20.8 Summarize knowledge of the food products & processing industry.

AFNR.HS.20.8.a Evaluate how different foods affect the human body and its physical and cellular processes.

AFNR.HS.20.8.b Identify food safety and sanitation procedures for handling and processing to as sure food quality.

AFNR.HS.20.8.c Summarize food safety procedures when storing and distributing products to consumption.

AFNR.HS.20.8.d Explain the producer-to-consumer processes in the food industry.

AFNR.HS.20.9 Summarize management principles, skills, and practices in agribusiness.

AFNR.HS.20.9.a Define major sectors within the agribusiness industry.

AFNR.HS.20.9.b Identify standard production and agribusiness records and plans.

AFNR.HS.20.9.c Identify common agribusiness terminology and tools to track and analyze business decisions and transactions.

AFNR.HS.20.9.d Articulate the role of markets, trade, competition, and price in relation to business sales and market planning.

AFNR.HS.20.9.e Identify aspects needed to develop and implement an effective record keeping strategy for financial and human resources.

AFNR.HS.20.10 Synthesize the historical, social, cultural, and potential applications of biotechnology.

AFNR.HS.20.10.a Identify and practice safe laboratory practices and procedures.

AFNR.HS.20.10.b Select and operate proper tools and equipment related to agricultural processes observing all safety precautions.

AFNR.HS.20.10.c Develop an agricultural project plan with the required project plan components (e.g., purpose, materials, budget, skills required, timeframe).

AFNR.HS.20.10.d Assess a project plan to completion.

ANIMAL SCIENCE

COURSE DESCRIPTION

This course focuses on the basic scientific principles and processes that are involved in animal physiology, breeding, nutrition, and care in preparation for an animal systems career. Topics include introduction to animal science, animal reproduction, animal nutrition, animal science issues, animal evaluation, and career opportunities. Classroom and laboratory activities are supplemented through supervised agricultural experiences and FFA leadership programs & activities.

STANDARDS AND INDICATORS:

AFNR.HS.11.1 Analyze historic and current trends impacting the animal system industry.

AFNR.HS.11.1.a	Identify and summarize the origin, significance, distribution, and domestication of different animal species.
AFNR.HS.11.1.b	Compare and contrast animal production methods for use in animal systems based upon their effectiveness and impacts.
AFNR.HS.11.1.c	Research and summarize major components of animal systems (e.g., livestock, companion animals).

AFNR.HS.11.2 Evaluate animals based on anatomical and physiological characteristics.

AFNR.HS.11.2.a	Classify animals according to taxonomic classification systems and use (e.g., companion, production).
AFNR.HS.11.2.b	Identify and summarize the properties, locations, functions, and types of animal cells, tissues, organs, and body systems.
AFNR.HS.11.2.c	Apply knowledge of anatomical and physiological characteristics of animals to select animals for specific purposes (e.g., meat animals, breeding animals, seedstock.

ANIMAL SCIENCE (cont.)

AFNR.HS.11.3 Critique best-practice protocols based upon animal behaviors for animal husbandry and welfare.

AFNR.HS.11.3.a Explain the implications of animal welfare and animal rights for animal systems.

AFNR.HS.11.3.b Summarize the challenges involved in working with animals and resources available to overcome them (e.g., tools, technology, equipment, facilities, animal behavior signals).

AFNR.HS.11.3.c Evaluate animal welfare procedures used to ensure safety and maintain low stress when moving and restraining animals.

AFNR.HS.11.4 Apply reproductive principles to animal selection, breeding, and production.

AFNR.HS.11.4.a Identify and categorize reproductive organs of major animal species.

AFNR.HS.11.4.b Identify and summarize inheritance and terms related to inheritance within animal breeding (e.g., dominant, co-dominant,recessive, homozygous, heterozygous).

AFNR.HS.11.4.c Compare and contrast various breeding systems (e.g., artificial insemination, embryo transfer, hand breeding).

AFNR.HS.11.4.d Assess and describe factors that lead to reproductive maturity.

AFNR.HS.11.4.e Evaluate and select animals for reproductive readiness.

AFNR.HS.11.5 Analyze the nutritional needs of animals.

AFNR.HS.11.5.a Identify and summarize essential nutrients required for animal health.

AFNR.HS.11.5.b Analyze each nutrient's role in growth and performance.

AFNR.HS.11.5.c Differentiate between nutritional needs of animal species based on a variety of factors (e.g., types of digestive systems, production goals, management system, growth stage, reproductive stage).

SMALL ANIMAL MANAGEMENT

COURSE DESCRIPTION

This course focuses on the management and care of small animals. Topics include animal welfare and handling, nutrition, reproduction, facility management, and small animal health care. Classroom and laboratory activities are supplemented through supervised agricultural experiences and FFA leadership programs & activities.

STANDARDS AND INDICATORS:

AFNR.HS.28.1 Analyze best-practice protocols based upon animal behaviors for animal husbandry and welfare.

AFNR.HS.28.1.a Describe and demonstrate management techniques that ensure animal welfare.

AFNR.HS.28.1.b Identify and categorize tools, technology, and equipment used in small animal management to ensure animal welfare (e.g., feeding, handling, grooming).

AFNR.HS.28.1.c Evaluate safety procedures and plans for working with animals by species using information based on animal behavior and responses.

AFNR.HS.28.2 Design and provide proper animal nutrition to achieve desired outcomes for performance, development, reproduction, and/or economic production.

AFNR.HS.28.2.a Analyze the nutritional needs of small animals in different growth stages and production systems.

AFNR.HS.28.2.b Examine and summarize the purpose of various components of animal food labels and feeding directions.

AFNR.HS.28.2.c Create a designated feeding and nutrition plan for small animals based on nutritional requirements.

SMALL ANIMAL MANAGEMENT (cont.)

AFNR.HS.28.3 Apply principles of animal reproduction to achieve desired outcomes for performance, development, and/or economic production.

AFNR.HS.28.3.a Identify and differentiate between the needs of breeding animals based on their growth stages (e.g., newborn, lactation, getstation).

AFNR.HS.28.3.b Demonstrate how to determine probability trait inheritance in animals.

AFNR.HS.28.3.c Select and evaluate breeding animals and determine the probability of a given trait in the offspring.

AFNR.HS.28.4 Evaluate environmental factors affecting performance and implement procedures for enhancing performance and animal health.

AFNR.HS.28.4.a Differentiate between the types of facilities needed to house and produce small animal species safely and efficiently.

AFNR.HS.28.4.b Identify and summarize the general requirements that must be met in facilities for animal housing and production.

AFNR.HS.28.4.c Design animal housing, equipment, and handling facilities focusing on animal requirements, economic efficiency, sustainability, safety, and ease of handling.

AFNR.HS.28.5 Apply principles of effective animal health care to the management of small animals.

AFNR.HS.28.5.a Identify and describe common illnesses and disorders of small animals based on symptoms and problems caused by wounds, diseases, parasites, and physiological disorders.

AFNR.HS.28.5.b Describe and demonstrate the proper use and function of specific tools and technology related to small animal health management.

AFNR.HS.28.5.c Research and analyze procedures at the local, state, and national levels to ensure biosecurity of the animal industry.

AFNR.HS.28.5.d Develop a biosecurity plan and procedures to prevent the spread of disease in small animals.

LARGE ANIMAL MANAGEMENT

COURSE DESCRIPTION

This course includes advanced scientific principles and communication skills that build on the knowledge and skills learned in Animal Science. Topics include production methods, animal welfare, nutrition, biosecurity, and housing. Classroom and laboratory activities are supplemented through supervised agricultural experiences and FFA leadership programs & activities.

STANDARDS AND INDICATORS:

AFNR.HS.22.1 Analyze animal production methods for use in animal systems based upon their effectiveness and impacts.

AFNR.HS.22.1.a Identify and categorize terms and methods related to animal production (e.g., sustainable, conventional, humanely raised, natural, organic).

AFNR.HS.22.1.b Identify marketing methods for animal products and services (e.g., conventional, niche markets, locally grown).

AFNR.HS.22.1.c Assess the impact of animal production methods on end-product qualities (e.g., price, sustainability, marketing, labeling, animal welfare).

AFNR.HS.22.2 Justify management techniques that ensure animal welfare.

AFNR.HS.22.2.a Distinguish between animal husbandry practices that promote animal welfare and those that do not.

AFNR.HS.22.2.b Devise, implement, and evaluate safety procedures and plans for working with animals by species using information based on animal behavior and responses.

AFNR.HS.22.2.c Design animal handling programs and procedures that assure the welfare of animals and prevent abuse or mistreatment.

LARGE ANIMAL MANAGEMENT (cont.)

AFNR.HS.22.3 Design feed rations to meet the nutritional needs of animals.

AFNR.HS.22.3.a Compare and contrast common types of feedstuffs for various species and the roles they play in the diets of those animals.

AFNR.HS.22.3.b Determine the relative nutritional value of feedstuffs by evaluating their general quality and condition.

AFNR.HS.22.3.c Differentiate between nutritional needs of animals in different growth stages and production systems (e.g., maintenance, gestation, natural, organic).

AFNR.HS.22.3.d Analyze balanced rations for animals based on the animal's growth stage (e.g., maintenance, newborn, gestation, lactation).

AFNR.HS.22.3.e Demonstrating the relationship between the nutrient requirements and the feedstuffs provided.

AFNR.HS.22.3.f Analyze the adequacy of feed rations using data from the analysis of feedstuffs, animal requirements, and performance.

AFNR.HS.22.4 Analyze biosecurity measures utilized to protect the welfare of animals on a local, state, national, and global level.

AFNR.HS.22.4.a Summarize the importance of biosecurity to the animal industry at multiple levels (e.g., local, state, national, global).

AFNR.HS.22.4.b Analyze procedures at the local, state, and national levels to ensure biosecurity of the animal industry.

AFNR.HS.22.4.c Evaluate a biosecurity plan for an animal production operation.

AFNR.HS.22.5 Design animal housing and equipment and handling facilities for the major systems of animal production.

AFNR.HS.22.5.a Differentiate between the types of housing facilities utilized to produce animal species safely and efficiently.

AFNR.HS.22.5.b Analyze designs for an animal facility and prescribe alternative layouts and adjustments for the safe, sustainable, and efficient use of the facility.

AFNR.HS.22.5.c Design an animal facility focusing on animal requirements, economic efficiency, sustainability, safety, and ease of handling.

VETERINARY SCIENCE

COURSE DESCRIPTION

This course introduces students to the basics of veterinary care. Topics covered include general animal care and welfare, animal health, laws and ethics relating to animal care, and workplace safety involving large, small, and exotic animals. Classroom and laboratory activities are supplemented through supervised agricultural experiences and FFA leadership programs & activities.

STANDARDS AND INDICATORS:

AFNR.HS.29.1 Assess animal production methods for use in animal systems based upon their effectiveness and impacts.

AFNR.HS.29.1.a Summarize the challenges involved in working with animals and identify resources available to overcome those challenges (e.g., tools, technology, equipment, facilities, animal behavior signals).

AFNR.HS.29.1.b Investigate animal husbandry practices and their impact on animal welfare.

AFNR.HS.29.1.c Compare the efficacy of different production methods and defend the use of selected methods using data and evidence.

AFNR.HS.29.2 Apply principles of comparative anatomy and physiology to uses within various animal systems.

AFNR.HS.29.2.a Compare and contrast animal cells, tissues, organs, body system types, and functions among species.

AFNR.HS.29.2.b Correlate the functions of animal cell structures to animal systems (e.g., growth, development, health, reproduction).

AFNR.HS.29.2.c Summarize the effect of anatomical and physiological disorders on animal health.

AFNR.HS.29.2.d Apply knowledge of anatomical and physiological characteristics of animals to make production, care, and management decisions.

VETERINARY SCIENCE (cont.)

AFNR.HS.29.3 Investigate methods of preventing and treating animal diseases, parasites, and other disorders to ensure animal welfare.

AFNR.HS.29.3.a Describe and demonstrate the proper use and function of specific tools and technology related to animal health management.

AFNR.HS.29.3.b Summarize the characteristics and symptoms of disorders that affect animals (e.g., wounds, common diseases, parasites, and physiological disorders) and example treatments.

AFNR.HS.29.3.c Explain the clinical significance of common veterinary methods and treatment (e.g., aseptic techniques, antibiotic use, wound management).

AFNR.HS.29.3.d Identify surgical and non-surgical veterinary treatments and procedures to meet specific animal health care objectives.

AFNR.HS.29.4 Analyze laws pertaining to animal systems.

AFNR.HS.29.4.a Summarize the structure of laws governing animal systems (e.g., animal production, harvesting, international trade policies).

AFNR.HS.29.4.b Analyze animal facilities to determine if government regulations and accepted safety standards have been met.

AFNR.HS.29.4.c Evaluate the impact of laws pertaining to animal agriculture (e.g., pros, cons, effect on individuals, effect on businesses) and assess the compliance of production practices with established regulations.

AFNR.HS.29.5 Analyze workplace safety laws and types of hazards and evaluate methods for handling and restraining large, small, and exotic animals.

AFNR.HS.29.5.a Identify commonly used veterinary terminology, convert commonly used weights and measures, and apply the terminology to routine veterinary practices.

AFNR.HS.29.5.b Analyze the health risk of different zoonotic diseases to humans and identify prevention methods.

AFNR.HS.29.5.c Evaluate preventative measures for controlling and limiting the spread of diseases, parasites, and disorders among animals.

AFNR.HS.29.5.d Evaluate various forms of handling and restraining large, small, and exotic animals.

AGRICULTURAL BIOTECHNOLOGY

COURSE DESCRIPTION

A course focusing on students examining the relationship between biotechnology and modern agriculture, food, and natural resource systems. Students identify purposes and methods of genetic modification of plants and animals and the impact of biotechnology on a global scale. Classroom and laboratory activities are supplemented through supervised agricultural experiences and FFA leadership programs & activities.

STANDARDS AND INDICATORS:

AFNR.HS.2.1 Assess factors that have influenced the evolution of biotechnology in agriculture.

AFNR.HS.2.1.a Summarize the evolution of biotechnology in agriculture.

AFNR.HS.2.1.b Summarize current work in biotechnology and the added value to agriculture and society.

AFNR.HS.2.1.c Compare and contrast the benefits and risks of biotechnology and conventional approaches to improving agriculture.

AFNR.HS.2.2 Evaluate the scope and implications of bioethics, law, and public perceptions of biotechnology in agriculture.

AFNR.HS.2.2.a Compare and contrast global regulatory systems for biotechnology in agriculture.

AFNR.HS.2.2.b Summarize the emergence, evolution, and implications of bioethics associated with biotechnology in agriculture.

AFNR.HS.2.2.c Describe the significance and impacts of legal issues related to biotechnology in agriculture.

AFNR.HS.2.2.d Investigate the impact of public perceptions on the application of biotechnology in different agriculture, food and natural resources (AFNR) systems.

AGRICULTURAL BIOTECHNOLOGY (cont.)

AFNR.HS.2.3 Apply appropriate laboratory skills to complete tasks in a biotechnology research and development environment (e.g., standard operating procedures, record keeping, aseptic technique, equipment maintenance).

AFNR.HS.2.3.a Maintain and interpret records documented in a laboratory to ensure data accuracy and integrity (e.g., avoid bias, record any conflicts of interest, avoid misinterpreted results).

AFNR.HS.2.3.b Categorize and identify laboratory equipment according to its purpose in scientific research.

AFNR.HS.2.3.c Apply standard operating procedures for the safe handling, management, and disposal of biological and chemical materials in a laboratory according to standard operating procedures.

AFNR.HS.2.3.d Identify the steps necessary to perform simple genetic modification.

AFNR.HS.2.4 Apply concepts of biotechnology to solve problems in Agriculture, Food, and Natural Resources (AFNR) systems (e.g., bioengineering, food processing, waste management, horticulture, forestry, livestock, crops).

AFNR.HS.2.4.a Identify biotechnology principles, techniques, and processes to create transgenic species through genetic engineering.

AFNR.HS.2.4.b Explain biotechnology principles, techniques, and processes to enhance the production of food through the use of microorganisms and enzymes.

AFNR.HS.2.4.c Apply biotechnology principles, techniques, and processes to protect the environment and maximize use of natural resources (e.g., biomass, bioprospecting, industrial biotechnology).

AFNR.HS.2.4.d Apply biotechnology principles, techniques, and processes to enhance plant and animal care and production (e.g., selective breeding, pharmaceuticals, biodiversity).

AFNR.HS.2.4.e Apply biotechnology principles, techniques and processes to produce biofuels (e.g., fermentation, transesterification, methanogenesis).

AFNR.HS.2.4.f Apply biotechnology principles, techniques, and processes to improve waste management (e.g., genetically modified organisms, bioremediation).

AGRICULTURE, FOOD, NATURAL RESOURCES LEADERSHIP, AND CAREER READINESS WITH WORK-BASED LEARNING

COURSE DESCRIPTION

This course will provide students with fundamental skills for success in agricultural careers and team environments. Students will investigate a variety of topics essential to career exploration and readiness in Agriculture, Food, and Natural Resources. In addition, students will develop skills in ethical leadership, communications, and teamwork.

STANDARDS AND INDICATORS:

AFNR.HS.10.1 Evaluate career opportunities and means to achieve those opportunities in each of the AFNR career pathways.

AFNR.HS.10.1.a	Demonstrate personal responsibility in the workplace and community.
AFNR.HS.10.1.b	Demonstrate career readiness skills for career success.
AFNR.HS.10.1.c	Evaluate the steps and requirements to pursue a career opportunity in an AFNR career pathway.
AFNR.HS.10.1.d	Apply appropriate academic and technical skills to demonstrate career success.
AFNR.HS.10.1.e	Examine career opportunities that are matched to personal life skills and talents and career goals in an AFNR pathway of interest.

AFNR.HS.10.2 Develop employability skills for college and career readiness within AFNR.

AFNR.HS.10.2.a	Model personal responsibility and demonstrate safety in the workplace and community.
AFNR.HS.10.2.b	Synthesize information, knowledge, and experience to generate original ideas and challenge assumptions in the workplace and community.
AFNR.HS.10.2.c	Apply reason and logic to evaluate workplace and community situations from multiple perspectives.
AFNR.HS.10.2.d	Investigate, prioritize, and select solutions to solve problems in the workplace community.
AFNR.HS.10.2.e	Contribute to team-oriented projects and build consensus to accomplish results using cultural global competence in the workplace and community.
AFNR.HS.10.2.f	Identify and demonstrate personal financial management and planning.

AGRICULTURE, FOOD, NATURAL RESOURCES LEADERSHIP, AND CAREER READINESS WITH WORK-BASED LEARNING (cont.)

AFNR.HS.10.3 Model teamwork and leadership skills in work groups.

AFNR.HS.10.3.a Employ cooperative leadership skills to accomplish a team goal.

AFNR.HS.10.3.b Model proper management of teams and large groups.

AFNR.HS.10.3.c Contribute to team-oriented projects to accomplish results using cultural global competence in the workplace and community.

AFNR.HS.10.4 Model integrity, ethical leadership, and effective management in AFNR career areas.

AFNR.HS.10.4.a Model characteristics of ethical and effective leaders in the workplace and community.

AFNR.HS.10.4.b Implement personal management skills to function effectively and efficiently in the workplace.

AFNR.HS.10.4.c Demonstrate workplace characteristics that contribute to a positive morale and workplace environment.

AFNR.HS.10.4.d Demonstrate ethical decision-making in real-life situations in agriculture, food, and natural resources.

AFNR.HS.10.5 Communicate information relevant to agriculture clearly, effectively, and with reason.

AFNR.HS.10.5.a Demonstrate basic information research skills and techniques.

AFNR.HS.10.5.b Produce clear, reasoned, and coherently produced, verbal, or visual communication for formal or informal settings.

AFNR.HS.10.5.c Communicate using strategies that ensure clarity, logic, purpose, and professionalism in formal or informal settings.

AFNR.HS.10.5.d Utilize new technologies, tools, and applications to maximize productivity and minimize risk in the workplace and community.

INTRODUCTION TO AGRICULTURE, FOOD, AND NATURAL RESOURCES

COURSE DESCRIPTION

The introductory course for the Agriculture, Food, and Natural Resources Career Cluster provides a knowledge base in the major components of the industry. Learners will be exposed to a broad range of agriculture, food, and natural resources careers, cluster foundation knowledge and skills, and introduction to leadership development and the National FFA Organization (FFA). Classroom and laboratory activities are supplemented through supervised agricultural experiences, career exploration activities, and FFA leadership programs & activities.

STANDARDS AND INDICATORS:

AFNR.HS.20.1 Apply leadership skills and knowledge through the study of the FFA Career and Technical Student Organization (CTSO).

AFNR.HS.20.1.a	Summarize the three-component model of a comprehensive Agricultural Education Program.
AFNR.HS.20.1.b	Recognize the mission, purpose, and key historical moments in the National FFA Organization.
AFNR.HS.20.1.c	Investigate opportunities available for a member of FFA.
AFNR.HS.20.1.d	Examine and practice public speaking.
AFNR.HS.20.1.e	Apply the basics of Parliamentary Procedure.

AFNR.HS.20.2 Apply career readiness principles in an authentic workplace environment.

AFNR.HS.20.2.a	Summarize the five components of a Foundational Supervised Agricultural Experience (SAE).
AFNR.HS.20.2.b	Investigate the five options for an Immersion SAE.
AFNR.HS.20.2.c	Articulate elements of career plans (e.g. academic, AFNR/CTE coursework, FFA/CTSO participation, immersion SAE) required in an AFNR workplace setting.

INTRODUCTION TO AGRICULTURE, FOOD, AND NATURAL RESOURCES (cont.)

AFNR.HS.20.3 Examine career options within agriculture, food, and natural resource systems and perform research based on personal interests.

AFNR.HS.20.3.a Inventory personal work preferences and interests related to the AFNR Career Field.

AFNR.HS.20.3.b Identify careers available in multiple AFNR Career Pathways.

AFNR.HS.20.3.c Determine common qualities of a specific career area (e.g., educational requirements, work environment).

AFNR.HS.20.3.d Identify necessary steps to prepare for a specific AFNR careers (coursework, post-secondary, needed skills).

AFNR.HS.20.3.e Identify opportunities for work placed learning within your community.

AFNR.HS.20.4 Evaluate the role of water, air, soil, and habitat in the management of natural resource systems.

AFNR.HS.20.4.a Summarize and classify the different natural resources (e.g., water, soil, renewable, non-renewable).

AFNR.HS.20.4.b Summarize the components that comprise all ecosystems.

AFNR.HS.20.4.c Compare and categorize biotic and abiotic factors in various habitats.

AFNR.HS.20.4.d Identify the importance of water and air quality.

AFNR.HS.20.4.e Identify the physical qualities of the soil that determine use for the environmental service system.

AFNR.HS.20.4.f Describe the importance of water conservation.

INTRODUCTION TO AGRICULTURE, FOOD, AND NATURAL RESOURCES (cont.)

AFNR.HS.20.5 Differentiate key terms, components, and uses for animals in animal systems.

AFNR.HS.20.5.a	Identify and summarize key terminology used in animal systems (e.g., heifer vs. cow, bull vs. steer, calving, farrowing, bovine, equine).
AFNR.HS.20.5.b	Define the function of basic external and internal organs of animals.
AFNR.HS.20.5.c	Differentiate production animals from companion animals.
AFNR.HS.20.5.d	Classify the major components of production animal systems (e.g., feedlots, cow-calf operations, farrow, finish) and regional distribution.
AFNR.HS.20.5.e	Categorize uses for and products generated from production animals.
AFNR.HS.20.5.f	Classify and determine uses for companion animals.

AFNR.HS.20.6 Summarize knowledge of plant anatomy and the functions of plant structures and processes to activities associated with plant systems.

AFNR.HS.20.6.a	Classify major components of the plant industry.
AFNR.HS.20.6.b	Classify plants according to life cycles.
AFNR.HS.20.6.c	Identify the function of plant parts.
AFNR.HS.20.6.d	Identify basic processes and role of photosynthesis, respiration, and transpiration.
AFNR.HS.20.6.e	Differentiate between sexual and asexual propagation techniques.

AFNR.HS.20.7 Synthesize the historical, social, cultural, and potential applications of biotechnology.

AFNR.HS.20.7.a	Summarize biotechnology and the historical impact it has had on agriculture.
AFNR.HS.20.7.b	Identify current and future applications of biotechnology in agriculture, food, and natural resources.
AFNR.HS.20.7.c	Identify common methodologies used in biotechnology.
AFNR.HS.20.7.d	Identify basic cellular structures and genetic terminology.
AFNR.HS.20.7.e	Summarize the scientific and social implications of modern genetically modified organisms.

INTRODUCTION TO AGRICULTURE, FOOD, AND NATURAL RESOURCES (cont.)

AFNR.HS.20.8 Summarize knowledge of the food products & processing industry.

- AFNR.HS.20.8.a Evaluate how different foods affect the human body and its physical and cellular processes.
- AFNR.HS.20.8.b Identify food safety and sanitation procedures for handling and processing to as sure food quality.
- AFNR.HS.20.8.c Summarize food safety procedures when storing and distributing products to consumption.
- AFNR.HS.20.8.d Explain the producer-to-consumer processes in the food industry.

AFNR.HS.20.9 Summarize management principles, skills, and practices in agribusiness.

- AFNR.HS.20.9.a Define major sectors within the agribusiness industry.
- AFNR.HS.20.9.b Identify standard production and agribusiness records and plans.
- AFNR.HS.20.9.c Identify common agribusiness terminology and tools to track and analyze business decisions and transactions.
- AFNR.HS.20.9.d Articulate the role of markets, trade, competition, and price in relation to business sales and market planning.
- AFNR.HS.20.9.e Identify aspects needed to develop and implement an effective record keeping strategy for financial and human resources.

AFNR.HS.20.10 Synthesize the historical, social, cultural, and potential applications of biotechnology.

- AFNR.HS.20.10.a Identify and practice safe laboratory practices and procedures.
- AFNR.HS.20.10.b Select and operate proper tools and equipment related to agricultural processes observing all safety precautions.
- AFNR.HS.20.10.c Develop an agricultural project plan with the required project plan components (e.g., purpose, materials, budget, skills required, timeframe).
- AFNR.HS.20.10.d Assess a project plan to completion.

DIVERSIFIED AGRICULTURE

COURSE DESCRIPTION

This course is the intermediate course in the Diversified Agriculture program of study in the Agriculture, Food, and Natural Resources (AFNR) career field. The course will further explore systems introduced in the Introduction to Agriculture, Food, and Natural Resources course, focusing on the interconnectivity of the systems. This course provides students with diverse knowledge and skillset to focus on issues from a diverse standpoint. Students will explore indicators integrated within the context of Animal, Plant, and Environmental and Natural Resources Pathways. Classroom and laboratory activities are supplemented through supervised agricultural experiences and FFA leadership programs and activities.

STANDARDS AND INDICATORS:

AFNR.HS.13.1 Analyze the interrelationships of natural resources and humans.

AFNR.HS.13.1.a	Describe the relationship between natural resources, ecosystems, and human activity.
AFNR.HS.13.1.b	Compare and contrast nonrenewable and renewable natural resources.
AFNR.HS.13.1.c	Explain how human activity affects the use and availability of natural resources (e.g., agriculture, industry, transportation).
AFNR.HS.13.1.d	Identify technologies used in harvesting, managing, improving, enhancing, and conserving natural resources.

AFNR.HS.13.2 Differentiate animal production methods for use in animal systems based upon their effectiveness and impacts.

AFNR.HS.13.2.a	Investigate fundamental biological processes in animals (e.g., digestion, reproduction, growth).
AFNR.HS.13.2.b	Apply principles of genetics to breeding and reproductive technology in animal systems (e.g., pure breeding, crossbreeding, grading) .
AFNR.HS.13.2.c	Analyze essential nutrient's role in animal growth and performance.
AFNR.HS.13.2.d	Explain the implications of animal welfare and animal rights for animal systems and distinguish between animal production practices (e.g., handling procedures, tools, facilities) that promote animal welfare and those that do not.

DIVERSIFIED AGRICULTURE (cont.)

AFNR.HS.13.3 Analyze the influence of environmental factors on plant growth and propagation.

AFNR.HS.13.3.a Summarize the sources and effects of plant-growing media, water, air, and light on plant growth.

AFNR.HS.13.3.b Analyze factors that affect photosynthesis, respiration, transpiration, translocation, and assimilation rates in plants.

AFNR.HS.13.3.c Identify the essential nutrients for plant growth and development and the correction of nutrient deficiencies.

AFNR.HS.13.3.d Characterize plant diseases, pests, disorders, and control measures.

AFNR.HS.13.3.e Demonstrate techniques used to propagate plants sexually and asexually (e.g., seeds, cuttings, grafting).

AFNR.HS.13.4 Investigate modern biotechnology applications, processes, scientific procedures, and ethical considerations.

AFNR.HS.13.4.a Compare and contrast common applications and methods of modern biotechnology (e.g., foods, fuels, pharmaceuticals, environmental).

AFNR.HS.13.4.b Investigate ethical considerations for the application of biotechnology within several fields (e.g., animal, plant, biofuels, natural resources).

AFNR.HS.13.4.c Design a communications plan to inform consumers about modern biotechnological applications.

AFNR.HS.13.5 Examine and explain the historical and current development of food products and processing.

AFNR.HS.13.5.a Examine consumer trends in food products and processing.

AFNR.HS.13.5.b Analyze strategies to create food products meeting and developing consumer trends.

AFNR.HS.13.5.c Assess industry standards in food products and processing.

DIVERSIFIED AGRICULTURE (cont.)

AFNR.HS.13.6 Utilize record keeping to accomplish business objectives in AFNR systems.

AFNR.HS.13.6.a Utilize financial reports to guide decision making. (e.g., break even, income statements, equity statements, budgets, cash flow, taxes).

AFNR.HS.13.6.b Apply risk management strategies.

AFNR.HS.13.6.c Analyze essential human resources within business enterprises.

AFNR.HS.13.7 Investigate and apply modern science and engineering principles for the use and maintenance of agricultural structures and equipment to improve performance.

AFNR.HS.13.7.a Determine structural requirements and specifications for agricultural structures.

AFNR.HS.13.7.b Develop maintenance plans for structures and equipment.

AFNR.HS.13.7.c Apply technology to improve efficiency in agricultural systems.

AFNR.HS.13.7.d Understand the operation and maintenance of agricultural equipment and power systems.

INTEGRATED AGRICULTURAL SCIENCE

COURSE DESCRIPTION

Integrated Ag Science is the capstone course in the Diversified Agriculture program of study in the Agriculture, Food, and Natural Resources (AFNR) career field. The course is designed to explore the interconnectedness of agriculture, within the broad goal of creating solutions to local and global issues within AFNR systems. Students will consider current and historical issues affecting or affected by AFNR, and utilize current knowledge and technology in addressing these issues. Classroom and laboratory activities are supplemented through supervised agricultural experiences and FFA leadership programs & activities.

STANDARDS AND INDICATORS:

AFNR.HS.19.1 Implement production and management plans in Agricultural, Food and Natural Resources (AFNR) systems (e.g., broiler houses, dairy farms, grain production, greenhouses, turf grass management, feed yards.)

AFNR.HS.19.1.a	Compare and contrast methods to assure needs the needs of living organisms (e.g., nutritional, health, environmental, biosecurity) are met efficiently and economically.
AFNR.HS.19.1.b	Identify pest control strategies associated with integrated pest management and the importance of determining economic threshold.
AFNR.HS.19.1.c	Design structural (e.g., housing, equipment, handling, processing, storage) facilities for the major systems of agriculture that are effective and efficient.
AFNR.HS.19.1.d	Implement appropriate equipment and power systems in the agricultural industry.
AFNR.HS.19.1.e	Analyze practices used to maintain a safe product through production, harvest, processing, storage, and shipment to ensure products are safe for consumption.
AFNR.HS.19.1.f	Compare methods used to reduce the effects of rural and/or urban production on the environment.
AFNR.HS.19.1.g	Summarize the types, purposes, and characteristics of effective planning, risk management, marketing, record keeping, and documentation practices for AFNR systems.
AFNR.HS.19.1.h	Interpret the economic impact of the agriculture industry to the local community, state, nation, and world.
AFNR.HS.19.1.i	Assess the alignment of modern technologies used in production systems (e.g., precision agriculture, biotechnology, veterinary, housing) with USDA sustainable practices criteria.

INTEGRATED AGRICULTURAL SCIENCE (cont.)

AFNR.HS.19.2 Develop reasoned solutions to agricultural issues, problems, and applications using data, science, research, and technology. (e.g., trade policy, climate change, sustainability in agriculture, rural infrastructure, Farm bill, food safety, farm financial stress, agricultural labor reform, world hunger)

AFNR.HS.19.2.a Assess a variety of agricultural situations and devise ways to improve efficiency and value to production, processes, and/or procedures.

AFNR.HS.19.2.b Investigate and determine the root cause of a problem.

AFNR.HS.19.2.c Create an implementation plan, considering prioritized solutions, to act on new ideas.

AFNR.HS.19.2.d Consider the economic, social, community, environmental, and personal impact of solutions.

AFNR.HS.19.3 Apply management skills to organize and guide decisions in the agricultural industry.

AFNR.HS.19.3.a Utilize industry standards to manage physical, financial, and human resources.

AFNR.HS.19.3.b Identify applicable local, state, federal, and international laws and regulations.

AFNR.HS.19.3.c Develop business goals and purpose-guiding resource allocation and operation.

AGRICULTURE, FOOD, NATURAL RESOURCES LEADERSHIP, AND CAREER READINESS WITH WORK-BASED LEARNING

COURSE DESCRIPTION

This course will provide students with fundamental skills for success in agricultural careers and team environments. Students will investigate a variety of topics essential to career exploration and readiness in Agriculture, Food, and Natural Resources. In addition, students will develop skills in ethical leadership, communications, and teamwork. Classroom and laboratory activities are supplemented through supervised agricultural experiences and FFA leadership programs & activities.

STANDARDS AND INDICATORS:

AFNR.HS.10.1 Evaluate career opportunities and means to achieve those opportunities in each of the AFNR career pathways.

AFNR.HS.10.1.a	Demonstrate personal responsibility in the workplace and community.
AFNR.HS.10.1.b	Demonstrate career readiness skills for career success.
AFNR.HS.10.1.c	Evaluate the steps and requirements to pursue a career opportunity in an AFNR career pathway.
AFNR.HS.10.1.d	Apply appropriate academic and technical skills to demonstrate career success.
AFNR.HS.10.1.e	Examine career opportunities that are matched to personal life skills and talents and career goals in an AFNR pathway of interest.

AFNR.HS.10.2 Develop employability skills for college and career readiness within AFNR.

AFNR.HS.10.2.a	Model personal responsibility and demonstrate safety in the workplace and community.
AFNR.HS.10.2.b	Synthesize information, knowledge, and experience to generate original ideas and challenge assumptions in the workplace and community.
AFNR.HS.10.2.c	Apply reason and logic to evaluate workplace and community situations from multiple perspectives.
AFNR.HS.10.2.d	Investigate, prioritize, and select solutions to solve problems in the workplace community.
AFNR.HS.10.2.e	Contribute to team-oriented projects and build consensus to accomplish results using cultural global competence in the workplace and community.
AFNR.HS.10.2.f	Identify and demonstrate personal financial management and planning.

AGRICULTURE, FOOD, NATURAL RESOURCES LEADERSHIP, AND CAREER READINESS WITH WORK-BASED LEARNING (cont.)

AFNR.HS.10.3 Model teamwork and leadership skills in work groups.

AFNR.HS.10.3.a Employ cooperative leadership skills to accomplish a team goal.

AFNR.HS.10.3.b Model proper management of teams and large groups.

AFNR.HS.10.3.c Contribute to team-oriented projects to accomplish results using cultural global competence in the workplace and community.

AFNR.HS.10.4 Model integrity, ethical leadership, and effective management in AFNR career areas.

AFNR.HS.10.4.a Model characteristics of ethical and effective leaders in the workplace and community.

AFNR.HS.10.4.b Implement personal management skills to function effectively and efficiently in the workplace.

AFNR.HS.10.4.c Demonstrate workplace characteristics that contribute to a positive morale and workplace environment.

AFNR.HS.10.4.d Demonstrate ethical decision-making in real-life situations in agriculture, food, and natural resources.

AFNR.HS.10.5 Communicate information relevant to agriculture clearly, effectively, and with reason.

AFNR.HS.10.5.a Demonstrate basic information research skills and techniques.

AFNR.HS.10.5.b Produce clear, reasoned, and coherently produced, verbal, or visual communication for formal or informal settings.

AFNR.HS.10.5.c Communicate using strategies that ensure clarity, logic, purpose, and professionalism in formal or informal settings.

AFNR.HS.10.5.d Utilize new technologies, tools, and applications to maximize productivity and minimize risk in the workplace and community.

INTRODUCTION TO AGRICULTURE, FOOD, AND NATURAL RESOURCES

COURSE DESCRIPTION

The introductory course for the Agriculture, Food, and Natural Resources Career Cluster provides a knowledge base in the major components of the industry. Learners will be exposed to a broad range of agriculture, food, and natural resources careers, cluster foundation knowledge and skills, and introduction to leadership development and the National FFA Organization (FFA). Classroom and laboratory activities are supplemented through supervised agricultural experiences, career exploration activities, and FFA leadership programs & activities.

STANDARDS AND INDICATORS:

AFNR.HS.20.1 Apply leadership skills and knowledge through the study of the FFA Career and Technical Student Organization (CTSO).

AFNR.HS.20.1.a	Summarize the three-component model of a comprehensive Agricultural Education Program.
AFNR.HS.20.1.b	Recognize the mission, purpose, and key historical moments in the National FFA Organization.
AFNR.HS.20.1.c	Investigate opportunities available for a member of FFA.
AFNR.HS.20.1.d	Examine and practice public speaking.
AFNR.HS.20.1.e	Apply the basics of Parliamentary Procedure.

AFNR.HS.20.2 Apply career readiness principles in an authentic workplace environment.

AFNR.HS.20.2.a	Summarize the five components of a Foundational Supervised Agricultural Experience (SAE).
AFNR.HS.20.2.b	Investigate the five options for an Immersion SAE.
AFNR.HS.20.2.c	Articulate elements of career plans (e.g., academic, AFNR/CTE coursework, FFA/CTSO participation, immersion SAE) required in an AFNR workplace setting.

INTRODUCTION TO AGRICULTURE, FOOD, AND NATURAL RESOURCES (cont.)

AFNR.HS.20.3 Examine career options within agriculture, food, and natural resource systems and perform research based on personal interests.

AFNR.HS.20.3.a	Inventory personal work preferences and interests related to the AFNR Career Field.
AFNR.HS.20.3.b	Identify careers available in multiple AFNR Career Pathways.
AFNR.HS.20.3.c	Determine common qualities of a specific career area (e.g., educational requirements, work environment).
AFNR.HS.20.3.d	Identify necessary steps to prepare for a specific AFNR careers (coursework, post-secondary, needed skills).
AFNR.HS.20.3.e	Identify opportunities for work placed learning within your community.

AFNR.HS.20.4 Evaluate the role of water, air, soil, and habitat in the management of natural resource systems.

AFNR.HS.20.4.a	Summarize and classify the different natural resources (e.g., water, soil, renewable, non-renewable).
AFNR.HS.20.4.b	Summarize the components that comprise all ecosystems.
AFNR.HS.20.4.c	Compare and categorize biotic and abiotic factors in various habitats.
AFNR.HS.20.4.d	Identify the importance of water and air quality.
AFNR.HS.20.4.e	Identify the physical qualities of the soil that determine use for the environmental service system.
AFNR.HS.20.4.f	Describe the importance of water conservation.

INTRODUCTION TO AGRICULTURE, FOOD, AND NATURAL RESOURCES (cont.)

AFNR.HS.20.5 Differentiate key terms, components, and uses for animals in animal systems.

AFNR.HS.20.5.a	Identify and summarize key terminology used in animal systems (e.g., heifer vs. cow, bull vs. steer, calving, farrowing, bovine, equine).
AFNR.HS.20.5.b	Define the function of basic external and internal organs of animals.
AFNR.HS.20.5.c	Differentiate production animals from companion animals.
AFNR.HS.20.5.d	Classify the major components of production animal systems (e.g., feedlots, cow-calf operations, farrow, finish) and regional distribution.
AFNR.HS.20.5.e	Categorize uses for and products generated from production animals.
AFNR.HS.20.5.f	Classify and determine uses for companion animals.

AFNR.HS.20.6 Summarize knowledge of plant anatomy and the functions of plant structures and processes to activities associated with plant systems.

AFNR.HS.20.6.a	Classify major components of the plant industry.
AFNR.HS.20.6.b	Classify plants according to life cycles.
AFNR.HS.20.6.c	Identify the function of plant parts.
AFNR.HS.20.6.d	Identify basic processes and role of photosynthesis, respiration, and transpiration.
AFNR.HS.20.6.e	Differentiate between sexual and asexual propagation techniques.

AFNR.HS.20.7 Synthesize the historical, social, cultural, and potential applications of biotechnology.

AFNR.HS.20.7.a	Summarize biotechnology and the historical impact it has had on agriculture.
AFNR.HS.20.7.b	Identify current and future applications of biotechnology in agriculture, food, and natural resources.
AFNR.HS.20.7.c	Identify common methodologies used in biotechnology.
AFNR.HS.20.7.d	Identify basic cellular structures and genetic terminology.
AFNR.HS.20.7.e	Summarize the scientific and social implications of modern genetically modified organisms.

INTRODUCTION TO AGRICULTURE, FOOD, AND NATURAL RESOURCES (cont.)

AFNR.HS.20.8 Summarize knowledge of the food products & processing industry.

AFNR.HS.20.8.a Evaluate how different foods affect the human body and its physical and cellular processes.

AFNR.HS.20.8.b Identify food safety and sanitation procedures for handling and processing to as sure food quality.

AFNR.HS.20.8.c Summarize food safety procedures when storing and distributing products to consumption.

AFNR.HS.20.8.d Explain the producer-to-consumer processes in the food industry.

AFNR.HS.20.9 Summarize management principles, skills, and practices in agribusiness.

AFNR.HS.20.9.a Define major sectors within the agribusiness industry.

AFNR.HS.20.9.b Identify standard production and agribusiness records and plans.

AFNR.HS.20.9.c Identify common agribusiness terminology and tools to track and analyze business decisions and transactions.

AFNR.HS.20.9.d Articulate the role of markets, trade, competition, and price in relation to business sales and market planning.

AFNR.HS.20.9.e Identify aspects needed to develop and implement an effective record keeping strategy for financial and human resources.

AFNR.HS.20.10 Synthesize the historical, social, cultural, and potential applications of biotechnology.

AFNR.HS.20.10.a Identify and practice safe laboratory practices and procedures.

AFNR.HS.20.10.b Select and operate proper tools and equipment related to agricultural processes observing all safety precautions.

AFNR.HS.20.10.c Develop an agricultural project plan with the required project plan components (e.g., purpose, materials, budget, skills required, timeframe).

AFNR.HS.20.10.d Assess a project plan to completion.

ENVIRONMENTAL AND NATURAL RESOURCES

COURSE DESCRIPTION

This course provides opportunities for students to increase awareness of the close ties amongst living organisms as well as natural and environmental concerns with the interrelationships of living organisms and the world around us. Students are exposed to careers related to natural resources systems. Students also examine Nebraska's natural resources and management techniques. Classroom and laboratory activities are supplemented through supervised agricultural experiences and FFA leadership programs & activities.

STANDARDS AND INDICATORS:

AFNR.HS.15.1 Identify scientifically-based solutions to the management of natural resources.

AFNR.HS.15.1.a	Describe the agriculture technology behind the management techniques (e.g., contour cropping) of Nebraska's natural resources.
AFNR.HS.15.1.b	Identify proper use of tools utilized in natural resource management (e.g., atmometer, soil pH).
AFNR.HS.15.1.c	Describe common species of wildlife found in Nebraska.
AFNR.HS.15.1.d	Classify common species of grasses, forbes, shrubs, and trees found in Nebraska ecosystems.
AFNR.HS.15.1.e	Describe the impact and importance of natural resources to the people of Nebraska.

AFNR.HS.15.2 Analyze the interrelationships between natural resources and humans in the foundation of modern agriculture.

AFNR.HS.15.2.a	Distinguish current production methods within a context of modern agriculture production.
AFNR.HS.15.2.b	Identify the current programs in place with a focus on the conservation and sustainability of natural resources (e.g., Wetlands Reserve Program, Conservation Stewardship Program, Conservation Reserve Program, Source Water Protection Program).
AFNR.HS.15.2.c	Describe the role of local, state, and national agencies/organizations in the management of our local resources.
AFNR.HS.15.2.d	Identity production methods that are best suited to specific environmental conditions.
AFNR.HS.15.2.e	Analyze use of modern technology in relation to agriculture production and natural resource management.

ENVIRONMENTAL AND NATURAL RESOURCES (cont.)

AFNR.HS.15.3 Summarize environmental aspects to be considered in ensuring sustainable production and processing of natural resources.

AFNR.HS.15.3.a Identify components that comprise ecosystems and the relationships within such ecosystems.

AFNR.HS.15.3.b Outline the methods used to measure air quality.

AFNR.HS.15.3.c Explain the water cycle (e.g., hydrologic) and its management.

AFNR.HS.15.3.d Describe the soil formation process, soil types, and how they affect land use.

AFNR.HS.15.3.e Determine the economic and environmental value of the forestry industry.

AFNR.HS.15.4 Evaluate responsible management procedures and techniques to protect, maintain, enhance, and improve natural resources.

AFNR.HS.15.4.a Identify current management policies that are put in place by the local, state, and national government.

AFNR.HS.15.4.b Compare and contrast alternative energy sources used within the agricultural industry.

AFNR.HS.15.4.c Identify non-native and invasive species in Nebraska.

AFNR.HS.15.4.d Calculate the financial and environmental cost of non-native species.

WILDLIFE MANAGEMENT

COURSE DESCRIPTION

This course provides students the opportunity to increase awareness of the principles of wildlife management and conservation. Students will closely examine ecological concepts, habitat management, wildlife species identification, and recreational opportunities that the environment and wildlife provide. Classroom and laboratory activities are supplemented through supervised agricultural experiences and FFA leadership programs & activities.

STANDARDS AND INDICATORS:

AFNR.HS.30.1 Evaluate conservation and management techniques of natural resources and wildlife.

AFNR.HS.30.1.a Identify and classify common species of fauna found in Nebraska (e.g., tracks, pelts, scat, photos, other identifiers).

AFNR.HS.30.1.b Evaluate wildlife habitats to identify conservation and preservation practices for natural resources and approved practices in wildlife management.

AFNR.HS.30.1.c Analyze and interpret environmental and climate data to develop a management plan and determine proper methods of wildlife habitat improvement.

AFNR.HS.30.1.d Apply management techniques to increase wildlife populations, specifically involving those species native to Nebraska.

AFNR.HS.30.2 Analyze the human activities that influence the administration and management of natural resource management.

AFNR.HS.30.2.a Identify current state and national laws regarding private vs. public lands, hunting, fishing, wildlife, and fauna preservation.

AFNR.HS.30.2.b Summarize the impact of agriculture on natural resources through production practices, land characteristics, wildlife habitats, and ecosystems of Nebraska.

AFNR.HS.30.2.c Interpret current Nebraska laws and regulations while providing examples of mitigation techniques and policies for natural resources.

AFNR.HS.30.2.d Summarize the impact, dependence, and influence of natural resources management on humans and the environment.

WILDLIFE MANAGEMENT (cont.)

AFNR.HS.30.3 Summarize the components necessary to ensure sustainable production and processing of wildlife and natural resources.

AFNR.HS.30.3.a Identify the components that comprise an ecosystem.

AFNR.HS.30.3.b Identify the role of food chains in maintaining biodiversity within ecosystems.

AFNR.HS.30.3.c Summarize components of food webs and food chains found in ecosystems.

AFNR.HS.30.4.d Assess the impact of management techniques on Nebraska wildlife.

AFNR.HS.30.4 Describe responsible management procedures and techniques to protect, maintain, enhance, and improve natural resources.

AFNR.HS.30.4.a Identify non-native and invasive species to Nebraska ecosystems.

AFNR.HS.30.4.b Compare efforts to keep non-native species out of a local area.

AFNR.HS.30.4.c Calculate the financial cost of non-native species.

AFNR.HS.30.4.d Compare the benefits of conservation programs that enhance natural resources.

AFNR.HS.30.5 Analyze the impact of natural resources to the economy.

AFNR.HS.30.5.a Explain the impact and importance of natural resources to Nebraska agriculture.

AFNR.HS.30.5.b Compare and contrast the specifics of differing recreational activities related to the harvesting and managing of Nebraska natural resources.

AFNR.HS.30.5.c Compare the importance of wildlife to the local economies and recreational activities.

ENVIRONMENTAL AND NATURAL RESOURCES MANAGEMENT

COURSE DESCRIPTION

This course provides an opportunity for students to increase awareness of the close ties amongst living organisms as well as natural and environmental concerns with the interrelationships of living organisms and the world around us. Students will closely examine agencies that regulate our natural resources, explore the relationship between agriculture and natural resources, and develop an understanding of sustainability and the importance of conservation. Classroom and laboratory activities are supplemented through supervised agricultural experiences and FFA leadership programs & activities.

STANDARDS AND INDICATORS:

AFNR.HS.14.1 Analyze the relationships that have been established between humans and natural resources, specifically addressing sustainability of modern agriculture and governmental involvement of improvement methods.

AFNR.HS.14.1.a Compare and contrast renewable and nonrenewable resources in regards to their impact on water, soil, fish, wildlife, and forestry.

AFNR.HS.14.1.b Identify actions taken at local, state, and national levels to protect water quality, soil health, air quality, wildlife, and plant species.

AFNR.HS.14.1.c Assess historical events of the United States' conservation programs and the human population's attitude and ecological outlook on the nation's natural resources.

AFNR.HS.14.1.d Compare and contrast modern tools, equipment, machinery, and technology used to accomplish environmental tasks.

AFNR.HS.14.1.e Apply cartographic skills to determine area, boundaries, and elevations in relation to natural resources and modern agriculture.

ENVIRONMENTAL AND NATURAL RESOURCES MANAGEMENT (cont.)

AFNR.HS.14.2 Analyze the interrelationships between natural resources and humans and their effect on social, scientific, and industrial uses of natural resources.

AFNR.HS.14.2.a Explain current aspects of modern agriculture and the impact to natural resources.

AFNR.HS.14.2.b Evaluate the current programs in place with conservation and sustainability of natural resources within Nebraska (e.g., Conservation Reserve Program, Environmental Quality Incentives Program, Depredation, Private Waters Programs, Small Watershed Rehabilitation Program, Conservation Innovation Grants).

AFNR.HS.14.2.c Assess the importance of Nebraska conservation and sustainability programs.

AFNR.HS.14.2.d Describe the implementation of conservation programs.

AFNR.HS.14.2.e Critique the effectiveness of production methods that are relevant to different environmental conditions, conservation, and sustainability of natural resources.

AFNR.HS.14.2.f Analyze the impact of modern technology in agriculture and natural resources and its overall effect on natural resources.

AFNR.HS.14.3 Explain factors that contribute to ensuring sustainable natural resources production of wind energy, water quality, soil health, and forestry/rangeland health.

AFNR.HS.14.3.a Identify components of ecological succession and the linkage between carbon, water, and hydrogen biological cycles.

AFNR.HS.14.3.b Describe the components of the earth's atmosphere and the importance of air quality in relation to global warming.

AFNR.HS.14.3.c Explain the allocation of water sources in relation to natural resource management.

AFNR.HS.14.3.d Explain components of soil formation, classification, and erosion to explain land use of Nebraska Farmland.

AFNR.HS.14.3.e Summarize fire management strategies, forestry products, and woodland management aspects of the forest industry.

ENVIRONMENTAL AND NATURAL RESOURCES MANAGEMENT (cont.)

AFNR.HS.14.4 Critique management procedures and techniques to protect, maintain, enhance, and improve natural resources.

AFNR.HS.14.4.a Analyze the effectiveness of specific environmental regulation policies (e.g., Clean Air Act, EISA, Clean Water Act, Superfund).

AFNR.HS.14.4.b Distinguish between alternative energy sources and determine the benefits/costs of such energy sources.

AFNR.HS.14.4.c Compare non-native and invasive species in Nebraska and their impact on the local and state-wide agricultural economy.

AFNR.HS.14.4.d Analyze the financial and environmental cost and issues related to the introduction of non-native species.

AGRICULTURE, FOOD, NATURAL RESOURCES LEADERSHIP, AND CAREER READINESS WITH WORK-BASED LEARNING

COURSE DESCRIPTION

This course will provide students with fundamental skills for success in agricultural careers and team environments. Students will investigate a variety of topics essential to career exploration and readiness in Agriculture, Food, and Natural Resources. In addition, students will develop skills in ethical leadership, communications, and teamwork. Classroom and laboratory activities are supplemented through supervised agricultural experiences and FFA leadership programs and activities.

STANDARDS AND INDICATORS:

AFNR.HS.10.1 Evaluate career opportunities and means to achieve those opportunities in each of the AFNR career pathways.

AFNR.HS.10.1.a	Demonstrate personal responsibility in the workplace and community.
AFNR.HS.10.1.b	Demonstrate career readiness skills for career success.
AFNR.HS.10.1.c	Evaluate the steps and requirements to pursue a career opportunity in an AFNR career pathway.
AFNR.HS.10.1.d	Apply appropriate academic and technical skills to demonstrate career success.
AFNR.HS.10.1.e	Examine career opportunities that are matched to personal life skills and talents and career goals in an AFNR pathway of interest.

AFNR.HS.10.2 Develop employability skills for college and career readiness within AFNR.

AFNR.HS.10.2.a	Model personal responsibility and demonstrate safety in the workplace and community.
AFNR.HS.10.2.b	Synthesize information, knowledge, and experience to generate original ideas and challenge assumptions in the workplace and community.
AFNR.HS.10.2.c	Apply reason and logic to evaluate workplace and community situations from multiple perspectives.
AFNR.HS.10.2.d	Investigate, prioritize, and select solutions to solve problems in the workplace community.
AFNR.HS.10.2.e	Contribute to team-oriented projects and build consensus to accomplish results using cultural global competence in the workplace and community.
AFNR.HS.10.2.f	Identify and demonstrate personal financial management and planning.

AGRICULTURE, FOOD, NATURAL RESOURCES LEADERSHIP, AND CAREER READINESS WITH WORK-BASED LEARNING (cont.)

AFNR.HS.10.3 Model teamwork and leadership skills in work groups.

AFNR.HS.10.3.a Employ cooperative leadership skills to accomplish a team goal.

AFNR.HS.10.3.b Model proper management of teams and large groups.

AFNR.HS.10.3.c Contribute to team-oriented projects to accomplish results using cultural global competence in the workplace and community.

AFNR.HS.10.4 Model integrity, ethical leadership, and effective management in AFNR career areas.

AFNR.HS.10.4.a Model characteristics of ethical and effective leaders in the workplace and community.

AFNR.HS.10.4.b Implement personal management skills to function effectively and efficiently in the workplace.

AFNR.HS.10.4.c Demonstrate workplace characteristics that contribute to a positive morale and workplace environment.

AFNR.HS.10.4.d Demonstrate ethical decision-making in real-life situations in agriculture, food, and natural resources.

AFNR.HS.10.5 Communicate information relevant to agriculture clearly, effectively, and with reason.

AFNR.HS.10.5.a Demonstrate basic information research skills and techniques.

AFNR.HS.10.5.b Produce clear, reasoned, and coherently produced, verbal, or visual communication for formal or informal settings.

AFNR.HS.10.5.c Communicate using strategies that ensure clarity, logic, purpose, and professionalism in formal or informal settings.

AFNR.HS.10.5.d Utilize new technologies, tools, and applications to maximize productivity and minimize risk in the workplace and community.

INTRODUCTION TO AGRICULTURE, FOOD, AND NATURAL RESOURCES

COURSE DESCRIPTION

The introductory course for the Agriculture, Food, and Natural Resources Career Cluster provides a knowledge base in the major components of the industry. Learners will be exposed to a broad range of agriculture, food, and natural resources careers, cluster foundation knowledge and skills, and introduction to leadership development and the National FFA Organization (FFA). Classroom and laboratory activities are supplemented through supervised agricultural experiences, career exploration activities, and FFA leadership programs & activities.

STANDARDS AND INDICATORS:

AFNR.HS.20.1 Apply leadership skills and knowledge through the study of the FFA Career and Technical Student Organization (CTSO).

AFNR.HS.20.1.a	Summarize the three-component model of a comprehensive Agricultural Education Program.
AFNR.HS.20.1.b	Recognize the mission, purpose, and key historical moments in the National FFA Organization.
AFNR.HS.20.1.c	Investigate opportunities available for a member of FFA.
AFNR.HS.20.1.d	Examine and practice public speaking.
AFNR.HS.20.1.e	Apply the basics of Parliamentary Procedure.

AFNR.HS.20.2 Apply career readiness principles in an authentic workplace environment.

AFNR.HS.20.2.a	Summarize the five components of a Foundational Supervised Agricultural Experience (SAE).
AFNR.HS.20.2.b	Investigate the five options for an Immersion SAE.
AFNR.HS.20.2.c	Articulate elements of career plans (e.g., academic, AFNR/CTE coursework, FFA/CTSO participation, immersion SAE) required in an AFNR workplace setting.

INTRODUCTION TO AGRICULTURE, FOOD, AND NATURAL RESOURCES (cont.)

AFNR.HS.20.3 Examine career options within agriculture, food, and natural resource systems and perform research based on personal interests.

AFNR.HS.20.3.a	Inventory personal work preferences and interests related to the AFNR Career Field.
AFNR.HS.20.3.b	Identify careers available in multiple AFNR Career Pathways.
AFNR.HS.20.3.c	Determine common qualities of a specific career area (e.g., educational requirements, work environment).
AFNR.HS.20.3.d	Identify necessary steps to prepare for a specific AFNR careers (coursework, post-secondary, needed skills).
AFNR.HS.20.3.e	Identify opportunities for work placed learning within your community.

AFNR.HS.20.4 Evaluate the role of water, air, soil, and habitat in the management of natural resource systems.

AFNR.HS.20.4.a	Summarize and classify the different natural resources (e.g., water, soil, renewable, non-renewable).
AFNR.HS.20.4.b	Summarize the components that comprise all ecosystems.
AFNR.HS.20.4.c	Compare and categorize biotic and abiotic factors in various habitats.
AFNR.HS.20.4.d	Identify the importance of water and air quality.
AFNR.HS.20.4.e	Identify the physical qualities of the soil that determine use for the environmental service system.
AFNR.HS.20.4.f	Describe the importance of water conservation.

INTRODUCTION TO AGRICULTURE, FOOD, AND NATURAL RESOURCES (cont.)

AFNR.HS.20.5 Differentiate key terms, components, and uses for animals in animal systems.

- AFNR.HS.20.5.a Identify and summarize key terminology used in animal systems (e.g., heifer vs. cow, bull vs. steer, calving, farrowing, bovine, equine).
- AFNR.HS.20.5.b Define the function of basic external and internal organs of animals.
- AFNR.HS.20.5.c Differentiate production animals from companion animals.
- AFNR.HS.20.5.d Classify the major components of production animal systems (e.g., feedlots, cow-calf operations, farrow, finish) and regional distribution.
- AFNR.HS.20.5.e Categorize uses for and products generated from production animals.
- AFNR.HS.20.5.f Classify and determine uses for companion animals.

AFNR.HS.20.6 Summarize knowledge of plant anatomy and the functions of plant structures and processes to activities associated with plant systems.

- AFNR.HS.20.6.a Classify major components of the plant industry.
- AFNR.HS.20.6.b Classify plants according to life cycles.
- AFNR.HS.20.6.c Identify the function of plant parts.
- AFNR.HS.20.6.d Identify basic processes and role of photosynthesis, respiration, and transpiration.
- AFNR.HS.20.6.e Differentiate between sexual and asexual propagation techniques.

AFNR.HS.20.7 Synthesize the historical, social, cultural, and potential applications of biotechnology.

- AFNR.HS.20.7.a Summarize biotechnology and the historical impact it has had on agriculture.
- AFNR.HS.20.7.b Identify current and future applications of biotechnology in agriculture, food, and natural resources.
- AFNR.HS.20.7.c Identify common methodologies used in biotechnology.
- AFNR.HS.20.7.d Identify basic cellular structures and genetic terminology.
- AFNR.HS.20.7.e Summarize the scientific and social implications of modern genetically modified organisms.

INTRODUCTION TO AGRICULTURE, FOOD, AND NATURAL RESOURCES (cont.)

AFNR.HS.20.8 Summarize knowledge of the food products & processing industry.

- AFNR.HS.20.8.a Evaluate how different foods affect the human body and its physical and cellular processes.
- AFNR.HS.20.8.b Identify food safety and sanitation procedures for handling and processing to as sure food quality.
- AFNR.HS.20.8.c Summarize food safety procedures when storing and distributing products to consumption.
- AFNR.HS.20.8.d Explain the producer-to-consumer processes in the food industry.

AFNR.HS.20.9 Summarize management principles, skills, and practices in agribusiness.

- AFNR.HS.20.9.a Define major sectors within the agribusiness industry.
- AFNR.HS.20.9.b Identify standard production and agribusiness records and plans.
- AFNR.HS.20.9.c Identify common agribusiness terminology and tools to track and analyze business decisions and transactions.
- AFNR.HS.20.9.d Articulate the role of markets, trade, competition, and price in relation to business sales and market planning.
- AFNR.HS.20.9.e Identify aspects needed to develop and implement an effective record keeping strategy for financial and human resources.

AFNR.HS.20.10 Synthesize the historical, social, cultural, and potential applications of biotechnology.

- AFNR.HS.20.10.a Identify and practice safe laboratory practices and procedures.
- AFNR.HS.20.10.b Select and operate proper tools and equipment related to agricultural processes observing all safety precautions.
- AFNR.HS.20.10.c Develop an agricultural project plan with the required project plan components (e.g. purpose, materials, budget, skills required, timeframe).
- AFNR.HS.20.10.d Assess a project plan to completion.

FOOD SCIENCE AND SAFETY

COURSE DESCRIPTION

This course focuses on the importance of a safe, sanitary, and reliable food supply for human consumption, with a focus on food production and processing. Topics include an introduction to the food science industry and the identification of pathogenic foodborne illnesses and methods to prevent and control those illnesses. Students will explore food safety regulations and requirements in a variety of settings. Classroom and laboratory activities are supplemented through supervised agricultural experiences and FFA leadership programs & activities.

STANDARDS AND INDICATORS:

AFNR.HS.18.1 Investigate trends within the Food Science industry.

- AFNR.HS.18.1.a Identify food science career professions.
- AFNR.HS.18.1.b Evaluate career opportunities matched to personal life skills, talents, career goals, and local industry trends within the food science industry.
- AFNR.HS.18.1.c Develop an educational plan to successfully pursue a career in the food science industry.
- AFNR.HS.18.1.d Compare and contrast food production companies and the products they produce.

AFNR.HS.18.2 Assess the basic principles of proper nutrition, including the identification and evaluation of the six essential nutrients needed for good health.

- AFNR.HS.18.2.a Classify nutrients as either macro or micro.
- AFNR.HS.18.2.b Identify the dietary roles of the six macronutrients.
- AFNR.HS.18.2.c Develop dietary plans based on nutritional needs.

AFNR.HS.18.3 Evaluate the chemistry of food.

- AFNR.HS.18.3.a Differentiate between simple and complex carbohydrates and their uses in food processing.
- AFNR.HS.18.3.b Describe the functions of amino acids and proteins in food processing.
- AFNR.HS.18.3.c Describe the uses of lipids in food processing.
- AFNR.HS.18.3.d Identify the role of water in food processing.

FOOD SCIENCE AND SAFETY (cont.)

AFNR.HS.18.4 Evaluate the implications of microorganisms in food products on food processing and storage.

AFNR.HS.18.4.a	Distinguish between beneficial and harmful microorganisms and their roles in the creation or spoilage of food products.
AFNR.HS.18.4.b	Identify the process of creating foods utilizing the fermentation process.
AFNR.HS.18.4.c	Analyze conditions and factors that affect the growth of microorganisms within processing and storage facilities.
AFNR.HS.18.4.d	Determine the differences between multicellular parasites, bacteria, yeasts, molds, and viruses.
AFNR.HS.18.4.e	Determine appropriate ways to control and prevent microbial growth in food products.
AFNR.HS.18.4.f	Investigate microorganisms that cause food-borne illness in humans and how to control or eliminate them.

AFNR.HS.18.5 Assess the physics of food production.

AFNR.HS.18.5.a	Describe the influence of water on food products.
AFNR.HS.18.5.b	Identify a food's viscosity/fluidity.
AFNR.HS.18.5.c	Classify foods based on their water activity.
AFNR.HS.18.5.d	Explain the difference between smoke point, flash point, and fire point when dealing with oils in processing foods.
AFNR.HS.18.5.e	Explain the science behind emulsions and their role in food processing.

AFNR.HS.18.6 Evaluate principles and applications of food safety and sanitation.

AFNR.HS.18.6.a	Identify steps in the proper implementation of Hazard Analysis and Critical Control Points (HACCP) and Preventative Controls for Human Food.
AFNR.HS.18.6.b	Differentiate between Sanitation Standard Operating Procedures (SSOPs) and Good Manufacturing Practices (GMPs) and identify the purposes of each.
AFNR.HS.18.6.c	Evaluate procedures and inspection standards for sanitation in the food processing industry.
AFNR.HS.18.6.d	Analyze state and federal laws and regulations governing food inspection standards.

FOOD PRODUCTS AND TECHNOLOGY

COURSE DESCRIPTION

This course is an in-depth study of the development of food products from a variety of agricultural industries. Students will study the nutritional value of foods along with applying scientific processes such as microbiology and chemistry to the development of food products and analyze and select appropriate storage, distribution, and consumption methods for foods. Classroom and laboratory activities are supplemented through supervised agricultural experiences and FFA leadership programs & activities.

STANDARDS AND INDICATORS:

AFNR.HS.17.1 Apply principles of science to food processing to provide a safe, wholesome, and nutritious food supply for consumers.

AFNR.HS.17.1.a	Identify steps to design a research project in food science using the scientific method.
AFNR.HS.17.1.b	Explain how the chemical and physical properties of foods influence nutritional value and eating quality.
AFNR.HS.17.1.c	Compare and contrast the nutritive value of food and food groups.
AFNR.HS.17.1.d	Distinguish the common food constituents (e.g., proteins, carbohydrates, fats, vitamins, minerals, and water).
AFNR.HS.17.1.e	Compare and contrast food constituents and their relative value to consumers (e.g., product taste, appearance, nutrition).
AFNR.HS.17.1.f	Describe the purpose of common food additives.

AFNR.HS.17.2 Summarize harvesting, selection, and inspection techniques to obtain quality food products for processing.

AFNR.HS.17.2.a	Discuss factors that affect quality and yield grades of food products.
AFNR.HS.17.2.b	Summarize quality control inspections procedures for raw food products for processing.
AFNR.HS.17.2.c	Analyze accepted animal treatment and harvesting techniques.
AFNR.HS.17.2.d	Explain desirable and undesirable characteristics of both pre-mortem and post-mortem animals in relation to the production of food products.
AFNR.HS.17.2.e	Evaluate, grade, and classify food products.

FOOD PRODUCTS AND TECHNOLOGY (cont.)

AFNR.HS.17.3 Synthesize the steps in processing and preserving food and food products for sale and distribution.

AFNR.HS.17.3.a Analyze processing techniques to turn raw materials into consumer-ready products.

AFNR.HS.17.3.b Evaluate foods prepared for the fresh-food market based on factors such as shelf life, shrinkage, appearance, and weight.

AFNR.HS.17.3.c Identify steps in food preservation processing, using various methods and techniques.

AFNR.HS.17.3.d Evaluate ready-to-use food products.

AFNR.HS.17.3.e Analyze foods stored in varying conditions for quality, shelf life, and intended use.

AFNR.HS.17.4 Determine and apply steps in the process of preparing food and food products for sale and distribution.

AFNR.HS.17.4.a Identify the links between microbiology, chemistry, and physics in the development of a new food product.

AFNR.HS.17.4.b Explain the required components of a food label.

AFNR.HS.17.4.c Prepare and label foods according to the established standards of regulatory agencies.

AFNR.HS.17.4.d Formulate and package food products using weights and measures.

AFNR.HS.17.4.e Prepare appropriate labels for food products, including principle and information labels.

AGRICULTURE, FOOD, NATURAL RESOURCES LEADERSHIP AND CAREER READINESS WITH WORK-BASED LEARNING

COURSE DESCRIPTION

This course will provide students with fundamental skills for success in agricultural careers and team environments. Students will investigate a variety of topics essential to career exploration and readiness in Agriculture, Food, and Natural Resources. In addition, students will develop skills in ethical leadership, communications, and teamwork. Classroom and laboratory activities are supplemented through supervised agricultural experiences and FFA leadership programs & activities.

STANDARDS AND INDICATORS:

AFNR.HS.10.1 Evaluate career opportunities and means to achieve those opportunities in each of the AFNR career pathways.

AFNR.HS.10.1.a	Demonstrate personal responsibility in the workplace and community.
AFNR.HS.10.1.b	Demonstrate career readiness skills for career success.
AFNR.HS.10.1.c	Evaluate the steps and requirements to pursue a career opportunity in an AFNR career pathway.
AFNR.HS.10.1.d	Apply appropriate academic and technical skills to demonstrate career success.
AFNR.HS.10.1.e	Examine career opportunities that are matched to personal life skills and talents and career goals in an AFNR pathway of interest.

AFNR.HS.10.2 Develop employability skills for college and career readiness within AFNR.

AFNR.HS.10.2.a	Model personal responsibility and demonstrate safety in the workplace and community.
AFNR.HS.10.2.b	Synthesize information, knowledge, and experience to generate original ideas and challenge assumptions in the workplace and community.
AFNR.HS.10.2.c	Apply reason and logic to evaluate workplace and community situations from | multiple perspectives.
AFNR.HS.10.2.d	Investigate, prioritize, and select solutions to solve problems in the workplace community.
AFNR.HS.10.2.e	Contribute to team-oriented projects and build consensus to accomplish results using cultural global competence in the workplace and community.
AFNR.HS.10.2.f	Identify and demonstrate personal financial management and planning.

AGRICULTURE, FOOD, NATURAL RESOURCES LEADERSHIP AND CAREER READINESS WITH WORK-BASED LEARNING (cont.)

AFNR.HS.10.3 Model teamwork and leadership skills in work groups.

AFNR.HS.10.3.a Employ cooperative leadership skills to accomplish a team goal.

AFNR.HS.10.3.b Model proper management of teams and large groups.

AFNR.HS.10.3.c Contribute to team-oriented projects to accomplish results using cultural global competence in the workplace and community.

AFNR.HS.10.4 Model integrity, ethical leadership, and effective management in AFNR career areas.

AFNR.HS.10.4.a Model characteristics of ethical and effective leaders in the workplace and community.

AFNR.HS.10.4.b Implement personal management skills to function effectively and efficiently in the workplace.

AFNR.HS.10.4.c Demonstrate workplace characteristics that contribute to a positive morale and workplace environment.

AFNR.HS.10.4.d Demonstrate ethical decision-making in real-life situations in agriculture, food, and natural resources.

AFNR.HS.10.5 Communicate information relevant to agriculture clearly, effectively, and with reason.

AFNR.HS.10.5.a Demonstrate basic information research skills and techniques.

AFNR.HS.10.5.b Produce clear, reasoned, and coherently produced, verbal, or visual communication for formal or informal settings.

AFNR.HS.10.5.c Communicate using strategies that ensure clarity, logic, purpose, and professionalism in formal or informal settings.

AFNR.HS.10.5.d Utilize new technologies, tools, and applications to maximize productivity and minimize risk in the workplace and community.

INTRODUCTION TO AGRICULTURE, FOOD, AND NATURAL RESOURCES

COURSE DESCRIPTION

The introductory course for the Agriculture, Food, and Natural Resources Career Cluster provides a knowledge base in the major components of the industry. Learners will be exposed to a broad range of agriculture, food, and natural resources careers, cluster foundation knowledge and skills, and introduction to leadership development and the National FFA Organization (FFA). Classroom and laboratory activities are supplemented through supervised agricultural experiences, career exploration activities, and FFA leadership programs & activities.

STANDARDS AND INDICATORS:

AFNR.HS.20.1 Apply leadership skills and knowledge through the study of the FFA Career and Technical Student Organization (CTSO).

AFNR.HS.20.1.a	Summarize the three-component model of a comprehensive Agricultural Education Program.
AFNR.HS.20.1.b	Recognize the mission, purpose, and key historical moments in the National FFA Organization.
AFNR.HS.20.1.c	Investigate opportunities available for a member of FFA.
AFNR.HS.20.1.d	Examine and practice public speaking.
AFNR.HS.20.1.e	Apply the basics of Parliamentary Procedure.

AFNR.HS.20.2 Apply career readiness principles in an authentic workplace environment.

AFNR.HS.20.2.a	Summarize the five components of a Foundational Supervised Agricultural Experience (SAE).
AFNR.HS.20.2.b	Investigate the five options for an Immersion SAE.
AFNR.HS.20.2.c	Articulate elements of career plans (e.g., academic, AFNR/CTE coursework, FFA/CTSO participation, immersion SAE) required in an AFNR workplace setting.

INTRODUCTION TO AGRICULTURE, FOOD, AND NATURAL RESOURCES (cont.)

AFNR.HS.20.3 Examine career options within agriculture, food, and natural resource systems and perform research based on personal interests.

AFNR.HS.20.3.a Inventory personal work preferences and interests related to the AFNR Career Field.

AFNR.HS.20.3.b Identify careers available in multiple AFNR Career Pathways.

AFNR.HS.20.3.c Determine common qualities of a specific career area (e.g., educational requirements, work environment).

AFNR.HS.20.3.d Identify necessary steps to prepare for a specific AFNR careers (coursework, post-secondary, needed skills).

AFNR.HS.20.3.e Identify opportunities for work placed learning within your community.

AFNR.HS.20.4 Evaluate the role of water, air, soil, and habitat in the management of natural resource systems.

AFNR.HS.20.4.a Summarize and classify the different natural resources (e.g., water, soil, renewable, non-renewable).

AFNR.HS.20.4.b Summarize the components that comprise all ecosystems.

AFNR.HS.20.4.c Compare and categorize biotic and abiotic factors in various habitats.

AFNR.HS.20.4.d Identify the importance of water and air quality.

AFNR.HS.20.4.e Identify the physical qualities of the soil that determine use for the environmental service system.

AFNR.HS.20.4.f Describe the importance of water conservation.

INTRODUCTION TO AGRICULTURE, FOOD, AND NATURAL RESOURCES (cont.)

AFNR.HS.20.5 Differentiate key terms, components, and uses for animals in animal systems.

AFNR.HS.20.5.a	Identify and summarize key terminology used in animal systems (e.g., heifer vs. cow, bull vs. steer, calving, farrowing, bovine, equine).
AFNR.HS.20.5.b	Define the function of basic external and internal organs of animals.
AFNR.HS.20.5.c	Differentiate production animals from companion animals.
AFNR.HS.20.5.d	Classify the major components of production animal systems (e.g.,feedlots, cow-calf operations, farrow, finish) and regional distribution.
AFNR.HS.20.5.e	Categorize uses for and products generated from production animals.
AFNR.HS.20.5.f	Classify and determine uses for companion animals.

AFNR.HS.20.6 Summarize knowledge of plant anatomy and the functions of plant structures and processes to activities associated with plant systems.

AFNR.HS.20.6.a	Classify major components of the plant industry.
AFNR.HS.20.6.b	Classify plants according to life cycles.
AFNR.HS.20.6.c	Identify the function of plant parts.
AFNR.HS.20.6.d	Identify basic processes and role of photosynthesis, respiration, and transpiration.
AFNR.HS.20.6.e	Differentiate between sexual and asexual propagation techniques.

AFNR.HS.20.7 Synthesize the historical, social, cultural, and potential applications of biotechnology.

AFNR.HS.20.7.a	Summarize biotechnology and the historical impact it has had on agriculture.
AFNR.HS.20.7.b	Identify current and future applications of biotechnology in agriculture, food, and natural resources.
AFNR.HS.20.7.c	Identify common methodologies used in biotechnology.
AFNR.HS.20.7.d	Identify basic cellular structures and genetic terminology.
AFNR.HS.20.7.e	Summarize the scientific and social implications of modern genetically modified organisms.

INTRODUCTION TO AGRICULTURE, FOOD, AND NATURAL RESOURCES (cont.)

AFNR.HS.20.8 Summarize knowledge of the food products & processing industry.

AFNR.HS.20.8.a Evaluate how different foods affect the human body and its physical and cellular processes.

AFNR.HS.20.8.b Identify food safety and sanitation procedures for handling and processing to as sure food quality.

AFNR.HS.20.8.c Summarize food safety procedures when storing and distributing products to consumption.

AFNR.HS.20.8.d Explain the producer-to-consumer processes in the food industry.

AFNR.HS.20.9 Summarize management principles, skills, and practices in agribusiness.

AFNR.HS.20.9.a Define major sectors within the agribusiness industry.

AFNR.HS.20.9.b Identify standard production and agribusiness records and plans.

AFNR.HS.20.9.c Identify common agribusiness terminology and tools to track and analyze business decisions and transactions.

AFNR.HS.20.9.d Articulate the role of markets, trade, competition, and price in relation to business sales and market planning.

AFNR.HS.20.9.e Identify aspects needed to develop and implement an effective record keeping strategy for financial and human resources.

AFNR.HS.20.10 Synthesize the historical, social, cultural, and potential applications of biotechnology.

AFNR.HS.20.10.a Identify and practice safe laboratory practices and procedures.

AFNR.HS.20.10.b Select and operate proper tools and equipment related to agricultural processes observing all safety precautions.

AFNR.HS.20.10.c Develop an agricultural project plan with the required project plan components (e.g. purpose, materials, budget, skills required, timeframe).

AFNR.HS.20.10.d Assess a project plan to completion.

PLANT SCIENCE

COURSE DESCRIPTION

This course examines the scientific concepts related to plant systems. Students will examine plant classification, anatomy, physiology, and asexual and sexual propagation. In addition, students will develop an understanding of plant nutrition and growth and production methods. Classroom and laboratory activities are supplemented through supervised agricultural experiences, and FFA leadership programs & activities.

STANDARDS AND INDICATORS:

AFNR.HS.25.1 Synthesize the principles of taxonomic systems to classify plants.

AFNR.HS.25.1.a	Classify plants according to the hierarchical classification system, life cycles, plant use, and as monocotyledons or dicotyledons.
AFNR.HS.25.1.b	Describe how classification is used globally in plant identification.
AFNR.HS.25.1.c	Demonstrate the hierarchical classification of an agronomic plant and an ornamental plant.
AFNR.HS.25.1.d	Describe the importance of scientific nomenclature when identifying plants and give an example of a scientific name in association with its common name.

AFNR.HS.25.2 Summarize principles of plant anatomy to plant production and management.

AFNR.HS.25.2.a	Compare and contrast morphological characteristics of different plant types (e.g., woody and herbaceous plants).
AFNR.HS.25.2.b	Identify role of seed and fruit structures in plant culture and use.
AFNR.HS.25.2.c	Compare the functions, types, and parts of plant roots and stems.
AFNR.HS.25.2.d	Identify and describe the morphological characteristics and functions of different types of leaves.
AFNR.HS.25.2.e	Identify role of flower structures to plant breeding, production, and use.
AFNR.HS.25.2.f	Describe the structures and functions of plant cells and cell organelles.

PLANT SCIENCE (cont.)

AFNR.HS.25.3 Evaluate knowledge of photosynthesis and respiration to make decisions on plant production and management.

AFNR.HS.25.3.a Identify the processes of photosynthesis and its significance to plant life.

AFNR.HS.25.3.b Summarize the stages of cellular respiration and the resulting products and byproducts.

AFNR.HS.25.3.c Explain the pathway of water and nutrients entering and within plants.

AFNR.HS.25.3.d Describe the role of plant structures in primary plant growth (e.g., apical meristem).

AFNR.HS.25.3.e Identify and categorize the five groups of naturally occurring plant hormones and synthetic growth regulators.

AFNR.HS.25.3.f Compare and contrast the effects of transpiration and translocation on plants within different plant species.

AFNR.HS.25.4 Analyze sexual and asexual plant propagation techniques to successfully grow and propagate plants.

AFNR.HS.25.4.a Determine the purpose of and types of reproduction methods within the production of specific plants.

AFNR.HS.25.4.b Contrast types of pollination and/or fertilization of flowering plants.

AFNR.HS.25.4.c Demonstrate various planting techniques for providing favorable conditions for seed germination.

AFNR.HS.25.4.d Summarize optimal conditions for asexual propagation and demonstrate different techniques used to propagate plants.

AFNR.HS.25.4.e Describe environmental conditions and types of growing media conducive to optimal plant growth and development.

AFNR.HS.25.4.f Identify structures and technologies used for controlled atmosphere plant production.

PLANT SCIENCE (cont.)

AFNR.HS.25.5 Summarize management of plant development through the selection, planting, and growing of seeds and plants based on global demand, economic importance, and growing conditions.

AFNR.HS.25.5.a Summarize the benefits of preparing growing media prior to planting.

AFNR.HS.25.5.b Summarize the stages of plant growth and benefits of controlling plant growth.

AFNR.HS.25.5.c Summarize the uses of different growing methods for plant production (e.g., vertical farming, soil grown, container gardening, hydroponics, and aquaponics).

AFNR.HS.25.6 Summarize harvest, transporting, and storage of crops according to current industry standards.

AFNR.HS.25.6.a Identify harvesting methods and equipment, incorporating safety measures.

AFNR.HS.25.6.b Identify plant preparation methods for storing and shipping plants and plant products.

AFNR.HS.25.6.c Assess the stage of growth to determine crop maturity or marketability and demonstrate proper harvesting techniques.

CROP MANAGEMENT & AGRONOMY

COURSE DESCRIPTION

This course investigates advanced crop management production and management topics. Students develop an understanding of nutrition and fertilization methods, resource management, pest management, technology use, marketing, and sustainable systems. Classroom and laboratory activities are supplemented through supervised agricultural experiences, and FFA leadership programs & activities.

STANDARDS AND INDICATORS:

AFNR.HS.12.1 Summarize principles of taxonomic systems to classify plants.

AFNR.HS.12.1.a	Compare, contrast, and classify plants in a variety of areas (e.g., taxonomy, life cycle, plant use, structure).
AFNR.HS.12.1.b	Describe how classification is used globally in plant identification.
AFNR.HS.12.1.c	Describe the importance of scientific nomenclature when identifying plants and give an example of a scientific name in association with its common name.

AFNR.HS.12.2 Evaluate soil nutrients and soil management for healthy plant growth.

AFNR.HS.12.2.a	Identify the essential nutrients and their functions necessary for plant growth and development.
AFNR.HS.12.2.b	Analyze the effects and recognize environmental causes of nutrient deficiencies and toxicities.
AFNR.HS.12.2.c	Describe the influence of pH on the availability of nutrients in plant health.
AFNR.HS.12.2.d	Identify fertilizer sources of essential nutrients; explain and calculate fertilizer formulations and describe different methods of fertilizer application.
AFNR.HS.12.2.e	Summarize production methods focused on soil management (e.g., crop rotation, companion planting, cover crops).
AFNR.HS.12.2.f	Summarize the impact of environmental factors on nutrient availability.

CROP MANAGEMENT& AGRONOMY (cont.)

AFNR.HS.12.3 Develop pest control measures to minimize the impact on agronomic and horticultural crops.

AFNR.HS.12.3.a Identify and categorize abiotic and biotic plant pests, diseases, and disorders.

AFNR.HS.12.3.b Identify and assess local major weeds, insect pests, and infectious and noninfectious plant diseases.

AFNR.HS.12.3.c Examine the life cycle of major plant pests and diseases.

AFNR.HS.12.3.d Predict pest and disease problems based on environmental conditions and life cycles.

AFNR.HS.12.3.e Identify and summarize pest control strategies associated with integrated pest management and the importance of determining economic threshold.

AFNR.HS.12.3.f Distinguish between risks and benefits associated with the materials and methods used in plant pest management.

AFNR.HS.12.4 Summarize concepts of plant development through the selection, planting, and growing of seeds and plants, based on global demand, economic importance, and growing conditions.

AFNR.HS.12.4.a Summarize the purity of plant production material (virus index, invasive species, seed banks).

AFNR.HS.12.4.b Analyze how mechanical planting equipment performs soil preparation and seed placement.

AFNR.HS.12.4.c Determine desired seeding rate and/or numbers of vegetative materials needed for specified plant population or desired quantity of finished plants.

AFNR.HS.12.4.d Observe environmental conditions during the germination, growth, and development of a crop.

AFNR.HS.12.4.e Demonstrate proper techniques to control and manage plant growth through mechanical, cultural, or chemical means.

AFNR.HS.12.4.f Compare and contrast the technologies used in plant production.

CROP MANAGEMENT & AGRONOMY (cont.)

AFNR.HS.12.5 Summarize the processes in harvesting, transporting, and storing crops according to current industry standards.

AFNR.HS.12.5.a Identify and analyze processes used by mechanical harvesting methods, including ensuring safety measures.

AFNR.HS.12.5.b Evaluate crop yield and loss data and make recommendations to reduce crop loss.

AFNR.HS.12.5.c Demonstrate techniques for grading, handling. and packaging plants and plant products for distribution.

AFNR.HS.12.5.d Analyze practices used to maintain a safe product through harvest, processing, storage, and shipment (e.g., Food Safety Modernization Act, Good Agricultural Practices).

AFNR.HS.12.6 Evaluate principles and practices of sustainable cropping systems to plant production to recommend the ideal system for their local community.

AFNR.HS.12.6.a Identify the current topics in crop production and the role those topics play in management and production of agronomic crops.

AFNR.HS.12.6.b Assess the importance of long-term impacts on sustainable agriculture systems in relation to global food security.

AFNR.HS.12.6.c Analyze the alignment of modern technologies used in production systems (e.g., precision agriculture, gene editing technologies).

AFNR.HS.12.6.d Describe sustainable agricultural practices and how they relate to conventional agricultural practices.

AFNR.HS.12.6.e Compare and contrast differing research conclusions related to environmental factors on sustainable systems.

NURSERY MANAGEMENT

COURSE DESCRIPTION

This course examines the knowledge and skills needed to identify, produce, and manage horticultural plants. Topics include plant identification and production, nursery management, and development of schedules and estimates. Classroom and laboratory activities are supplemented through supervised agricultural experiences and FFA leadership programs & activities.

STANDARDS AND INDICATORS:

AFNR.HS.24.1 Synthesize the principles of taxonomic systems to classify plants.

AFNR.HS.24.1.a	Classify plants in a variety of areas (e.g., taxonomy, life cycle, plant use, structure).
AFNR.HS.24.1.b	Describe how classification is used globally in plant identification.
AFNR.HS.24.1.c	Identify landscape plants, using cultivars or varieties in a scientific name and the corresponding common name.
AFNR.HS.24.1.d	Categorize plants by their purpose (e.g., floral plants, landscape plants, house plants).

AFNR.HS.24.2 Apply methods of plant propagation for plant reproduction.

AFNR.HS.24.2.a	Demonstrate sowing techniques and provide favorable conditions for seed germination.
AFNR.HS.24.2.b	Explain the methods of asexual propagation and identify which species and varieties are best suited to each method.
AFNR.HS.24.2.c	Develop a schedule for propagation to meet seasonal production demands.

NURSERY MANAGEMENT (cont.)

AFNR.HS.24.3 Explain the influence of environmental factors, nutrients, and soil on plant growth through the plant management plans.

AFNR.HS.24.3.a Identify environmental factors involved in ornamental plant production including soils, water, pests, and human actions.

AFNR.HS.24.3.b Describe the desired characteristics of an ideal growing medium.

AFNR.HS.24.3.c Explain the techniques of soil sampling and relate this process to testing the growing medium and interpreting the results to recommend fertilizer applications and pH treatment.

AFNR.HS.24.3.d Evaluate how heat, humidity, and light affect the heating, cooling, and ventilation systems of a greenhouse.

AFNR.HS.24.3.e Develop a water management plan for field production, nursery, or a controlled environment.

AFNR.HS.24.3.f Analyze the deficiency symptoms of the major plant nutrients and investigate the economic impacts of those deficiencies.

AFNR.HS.24.4 Differentiate between field production, nursery, and greenhouse or controlled environment production and the plants produced in each.

AFNR.HS.24.4.a Describe in the correct order the steps utilized in integrated pest management (IPM) in relation to horticultural crops and landscapes.

AFNR.HS.24.4.b Identify common plant pests (insects and diseases) for horticultural crops and describe the damage inflicted to the plants.

AFNR.HS.24.4.c Explain the types of pest control methods and classification of herbicides and discuss the appropriate uses and safety measures for each type.

AFNR.HS.24.4.d Determine best management practices (BMP) for soil amendments, fertilizers, and pesticides.

AFNR.HS.24.4.e Plan for common greenhouse and nursery production materials needed based on spacing and crop requirements.

AFNR.HS.24.4.f Compare and contrast the different types of technologies and equipment used for production.

NURSERY MANAGEMENT (cont.)

AFNR.HS.24.5 Analyze how nursery plants are grown and managed.

AFNR.HS.24.5.a	Identify the various types of root production methods and compare the quality of the resulting plants.
AFNR.HS.24.5.b	Describe the differences between bare root, containerized, balled, and burlapped plants.
AFNR.HS.24.5.c	Use ANSI Standards to evaluate whether plants in various categories (evergreen, shrub) meet the standard.
AFNR.HS.24.5.d	Describe how the timing of transplanting affects plant quality.
AFNR.HS.24.5.e	Analyze production and delivery schedules for specific plant types and the associated labor required.
AFNR.HS.24.4.f	Interpret the reasons, methods, and timing for pruning woody and herbaceous plants for optimal plant growth.

LANDSCAPE DESIGN

COURSE DESCRIPTION

This course examines the knowledge and skills needed to identify, produce, and manage horticultural plants, understand and apply landscape design concepts, and manage turfgrass and landscape plants. Topics include plant identification, identifying and applying design principles, creating designs using scales and other hand-drawing tools and/or design software, and processes and products used in designing, constructing, and managing landscapes. Classroom and laboratory activities are supplemented through supervised agricultural experiences and FFA leadership programs & activities.

STANDARDS AND INDICATORS:

AFNR.HS.21.1 Investigate the importance of plant identification in choosing and using landscape plants.

AFNR.HS.21.1.a	Identify the importance of scientific nomenclature when identifying and selecting landscape plants, using cultivars or varieties in a scientific name and the corresponding common name.
AFNR.HS.21.1.b	Identify plants by their purpose (e.g., floral plants, landscape plants, house plants).
AFNR.HS.21.1.c.	Distinguish between various types of turfgrasses and compare how they are used in different landscape situations.
AFNR.HS.21.1.d	Develop knowledge of landscape characteristics and environmental requirements for landscape plants.
AFNR.HS.21.1.e	Describe the differences between annual, perennial, woody and herbaceous plants and how they are used in landscape design.

LANDSCAPE DESIGN (cont.)

AFNR.HS.21.2 Summarize methods of propagation and production for landscape needs.

AFNR.HS.21.2.a Explain the methods of asexual propagation and their importance in producing landscape plants.

AFNR.HS.21.2.b. Identify which species and of landscape plant varieties are best propagated asexually.

AFNR.HS.21.2.c Describe methods of producing turfgrass, including seed, asexual propagation, plugs, and sod.

AFNR.HS.21.2.d Develop a schedule for propagation and production to meet seasonal landscape needs.

AFNR.HS.21.2.e Describe how plants that do not meet ANSI Standards for Nursery Stock influence immediate and long-term landscape management processes.

AFNR.HS.21.3 Implement a landscape management plan that addresses the influence of environmental factors, nutrients, and soil on plant growth.

AFNR.HS.21.3.a Summarize the environmental factors involved in managing landscapes including soils, water, pests and human actions.

AFNR.HS.21.3.b Explain the techniques of soil sampling and relate this process to testing the soil and interpreting the results to recommend fertilizer applications and pH treatment.

AFNR.HS.21.3.c Develop a water management plan for a landscape that includes turfgrass, woody, and herbaceous plants.

AFNR.HS.21.3.d Analyze the deficiency symptoms of the major plant nutrients and investigate the economic impacts of those deficiencies.

LANDSCAPE DESIGN (cont.)

AFNR.HS.21.4 Develop a landscape plan to include hardscapes and plants.

AFNR.HS.21.4.a	Assess client needs to communicate effectively with clients throughout the design process.
AFNR.HS.21.4.b	Differentiate between design styles by interpreting the use of design principles (e.g., order, unity and rhythm) in a landscape plan.
AFNR.HS.21.4.c	Evaluate the use of design elements (e.g., scale, proportion, balance) in a landscape plan.
AFNR.HS.21.4.d	Analyze environmental conditions and human factors that will influence design decisions.
AFNR.HS.21.4.e	Determine if an irrigation system is needed and choose the appropriate type and components for optimal coverage.
AFNR.HS.21.4.f	Demonstrate how various plant types (e.g., conifers, deciduous shrubs) are combined as part of the landscape system for function, management, and aesthetics.
AFNR.HS.21.4.g	Determine plant materials and hardscape elements appropriate for the site and client, applying principles of sustainability.

AFNR.HS.21.5 Describe the seasonal differences for managing a landscape for a year.

AFNR.HS.21.5.a	Describe, in the correct order, the steps utilized in Integrated Pest Management (IPM).
AFNR.HS.21.5.b	Identify common plant pests (insects and diseases).
AFNR.HS.21.5.c	Describe the damage inflicted to the plants.
AFNR.HS.21.5.d	Explain the types of pest control methods and classification of herbicides and discuss the appropriate uses and safety measures for each type.
AFNR.HS.21.4.e	Compare situations where different soil amendments, fertilizers, and pesticides are used to determine best management practices (BMP).
AFNR.HS.21.4.f	Analyze how an irrigation plan provides optimal coverage for all plant types, including turfgrass.
AFNR.HS.21.4.g	Interpret the reasons, methods, and timing for pruning woody and herbaceous plants for optimal plant growth in landscapes.

LANDSCAPE DESIGN (cont.)

AFNR.HS.21.6 Recommend materials and methods appropriate for landscape needs.

AFNR.HS.21.6.a	Demonstrate knowledge of drawing tools and/or software to calculate area and volume with necessary conversions to figure accurate quantities of materials.
AFNR.HS.21.6.b	Use common calculations to compare prices for landscape plants and hardscape materials and their installation to recommend the most cost-effective approach.
AFNR.HS.21.6.c	Investigate equipment types and availability to recommend the appropriate equipment for installation and management.
AFNR.HS.21.6.d	Describe the process needed to construct and manage a landscape and create a cost analysis for the project.

FLORICULTURE

COURSE DESCRIPTION

This course will provide students with the necessary knowledge to apply design principles in the floral industry. Topics include history of the floral industry, processing techniques and tools, trends, and flower and foliage identification important in the design of quality floral arrangements. Classroom and laboratory activities are supplemented through supervised agricultural experiences, and FFA leadership programs & activities.

STANDARDS AND INDICATORS:

AFNR.HS.16.1 Synthesize the history of floriculture.

AFNR.HS.16.1.a	Explain the evolution of floriculture throughout history and describe how history has influenced today's floriculture.
AFNR.HS.16.1.b	Compare and contrast the three levels of the floriculture industry (grower, wholesaler, and retailer).
AFNR.HS.16.1.c	Analyze today's world floral production and marketing methods and trends.

AFNR.HS.16.2 Summarize key aspects of floral botany and processing.

AFNR.HS.16.2.a	Identify male and female parts of the flower and their functions.
AFNR.HS.16.2.b	Evaluate the function of the plant stem and its post-harvest physiology.
AFNR.HS.16.2.c	Recognize the inflorescence types and leaf form and their purpose.
AFNR.HS.16.2.d	Distinguish the roles of plant processes as they relate to cut plant materials.
AFNR.HS.16.2.e	Identify harvesting techniques and procedures used to cut quality materials and design a procedure for proper processing and storage.

AFNR.HS.16.3 Summarize the proper function and use of floral materials and tools.

AFNR.HS.16.3.a	Identify the common tools used in various methods of floral arranging and demonstrate correct and safe use of floral tools.
AFNR.HS.16.3.b	Identify common wire and ribbon sizes for various applications.
AFNR.HS.16.3.c	Explain special considerations (occasion and season) for selection of proper materials (e.g., ribbon, containers).

FLORICULTURE (cont.)

AFNR.HS.16.4 Classify common floriculture plants.

AFNR.HS.16.4.a Identify the major plants used in the floriculture industry by common and scientific names.

AFNR.HS.16.4.b Categorize major plants based on their use in floriculture (cut flower and/or foliage plants, potted flowering and/or foliage plants).

AFNR.HS.16.4.c Differentiate the uses of plants in a design: line, form, filler, foliage.

AFNR.HS.16.5 Synthesize principles of floral design.

AFNR.HS.16.5.a Identify the importance of floral design principles (e.g., color, design, line, texture, balance, focal point).

AFNR.HS.16.5.b Evaluate an arrangement based on design principles.

AFNR.HS.16.5.c Analyze current design trends that exist in the floral industry.

AFNR.HS.16.5.d Create a floral arrangement using design principles and materials to meet a specific occasion and budget.

AFNR.HS.16.5.e Delineate between wholesale and retail pricing of raw materials.

AGRICULTURAL BIOTECHNOLOGY

COURSE DESCRIPTION

This course focuses on students examining the relationship between biotechnology and modern agriculture, food, and natural resource systems. Students identify purposes and methods of genetic modification of plants and animals and the impact of biotechnology on a global scale. Classroom and laboratory activities are supplemented through supervised agricultural experiences and FFA leadership programs & activities.

STANDARDS AND INDICATORS:

AFNR.HS.2.1 Assess factors that have influenced the evolution of biotechnology in agriculture.

AFNR.HS.2.1.a Summarize the evolution of biotechnology in agriculture.

AFNR.HS.2.1.b Summarize current work in biotechnology and the added value to agriculture and society.

AFNR.HS.2.1.c Compare and contrast the benefits and risks of biotechnology and conventional approaches to improving agriculture.

AFNR.HS.2.2 Evaluate the scope and implications of bioethics, law, and public perceptions of biotechnology in agriculture.

AFNR.HS.2.2.a Compare and contrast global regulatory systems for biotechnology in agriculture.

AFNR.HS.2.2.b Summarize the emergence, evolution, and implications of bioethics associated with biotechnology in agriculture.

AFNR.HS.2.2.c Describe the significance and impacts of legal issues related to biotechnology in agriculture.

AFNR.HS.2.2.d Investigate the impact of public perceptions on the application of biotechnology in different agriculture, food and natural resources (AFNR) systems.

AGRICULTURAL BIOTECHNOLOGY (cont.)

AFNR.HS.2.3 Apply appropriate laboratory skills to complete tasks in a biotechnology research and development environment (e.g., standard operating procedures, record keeping, aseptic technique, equipment maintenance).

AFNR.HS.2.3.a Maintain and interpret records documented in a laboratory to ensure data accuracy and integrity (e.g., avoid bias, record any conflicts of interest, avoid misinterpreted results).

AFNR.HS.2.3.b Categorize and identify laboratory equipment according to its purpose in scientific research.

AFNR.HS.2.3.c Apply standard operating procedures for the safe handling, management, and disposal of biological and chemical materials in a laboratory according to standard operating procedures.

AFNR.HS.2.3.d Identify the steps necessary to perform simple genetic modification.

AFNR.HS.2.4 Apply concepts of biotechnology to solve problems in Agriculture, Food, and Natural Resources (AFNR) systems (e.g., bioengineering, food processing, waste management, horticulture, forestry, livestock, crops).

AFNR.HS.2.4.a Identify biotechnology principles, techniques, and processes to create transgenic species through genetic engineering.

AFNR.HS.2.4.b Explain biotechnology principles, techniques, and processes to enhance the production of food through the use of microorganisms and enzymes.

AFNR.HS.2.4.c Apply biotechnology principles, techniques, and processes to protect the environment and maximize use of natural resources (e.g., biomass, bioprospecting, industrial biotechnology).

AFNR.HS.2.4.d Apply biotechnology principles, techniques, and processes to enhance plant and animal care and production (e.g., selective breeding, pharmaceuticals, biodiversity).

AFNR.HS.2.4.e Apply biotechnology principles, techniques and processes to produce biofuels (e.g., fermentation, transesterification, methanogenesis).

AFNR.HS.2.4.f Apply biotechnology principles, techniques, and processes to improve waste management (e.g., genetically modified organisms, bioremediation).

AGRICULTURE, FOOD, NATURAL RESOURCES LEADERSHIP, CAREER READINESS WITH WORK-BASED LEARNING

COURSE DESCRIPTION

This course will provide students with fundamental skills for success in agricultural careers and team environments. Students will investigate a variety of topics essential to career exploration and readiness in Agriculture, Food, and Natural Resources. In addition, students will develop skills in ethical leadership, communications, and teamwork. Classroom and laboratory activities are supplemented through supervised agricultural experiences and FFA leadership programs & activities.

STANDARDS AND INDICATORS:

AFNR.HS.10.1 Evaluate career opportunities and means to achieve those opportunities in each of the AFNR career pathways.

AFNR.HS.10.1.a	Demonstrate personal responsibility in the workplace and community.
AFNR.HS.10.1.b	Demonstrate career readiness skills for career success.
AFNR.HS.10.1.c	Evaluate the steps and requirements to pursue a career opportunity in an AFNR career pathway.
AFNR.HS.10.1.d	Apply appropriate academic and technical skills to demonstrate career success.
AFNR.HS.10.1.e	Examine career opportunities that are matched to personal life skills and talents and career goals in an AFNR pathway of interest.

AFNR.HS.10.2 Develop employability skills for college and career readiness within AFNR.

AFNR.HS.10.2.a	Model personal responsibility and demonstrate safety in the workplace and community.
AFNR.HS.10.2.b	Synthesize information, knowledge, and experience to generate original ideas and challenge assumptions in the workplace and community.
AFNR.HS.10.2.c	Apply reason and logic to evaluate workplace and community situations from multiple perspectives.
AFNR.HS.10.2.d	Investigate, prioritize, and select solutions to solve problems in the workplace community.
AFNR.HS.10.2.e	Contribute to team-oriented projects and build consensus to accomplish results using cultural global competence in the workplace and community.
AFNR.HS.10.2.f	Identify and demonstrate personal financial management and planning.

AGRICULTURE, FOOD, NATURAL RESOURCES LEADERSHIP, CAREER READINESS WITH WORK-BASED LEARNING (cont.)

AFNR.HS.10.3 Model teamwork and leadership skills in work groups.

AFNR.HS.10.3.a Employ cooperative leadership skills to accomplish a team goal.

AFNR.HS.10.3.b Model proper management of teams and large groups.

AFNR.HS.10.3.c Contribute to team-oriented projects to accomplish results using cultural global competence in the workplace and community.

AFNR.HS.10.4 Model integrity, ethical leadership, and effective management in AFNR career areas.

AFNR.HS.10.4.a Model characteristics of ethical and effective leaders in the workplace and community.

AFNR.HS.10.4.b Implement personal management skills to function effectively and efficiently in the workplace.

AFNR.HS.10.4.c Demonstrate workplace characteristics that contribute to a positive morale and workplace environment.

AFNR.HS.10.4.d Demonstrate ethical decision-making in real-life situations in agriculture, food, and natural resources.

AFNR.HS.10.5 Communicate information relevant to agriculture clearly, effectively, and with reason.

AFNR.HS.10.5.a Demonstrate basic information research skills and techniques.

AFNR.HS.10.5.b Produce clear, reasoned, and coherently produced, verbal, or visual communication for formal or informal settings.

AFNR.HS.10.5.c Communicate using strategies that ensure clarity, logic, purpose, and professionalism in formal or informal settings.

AFNR.HS.10.5.d Utilize new technologies, tools, and applications to maximize productivity and minimize risk in the workplace and community.