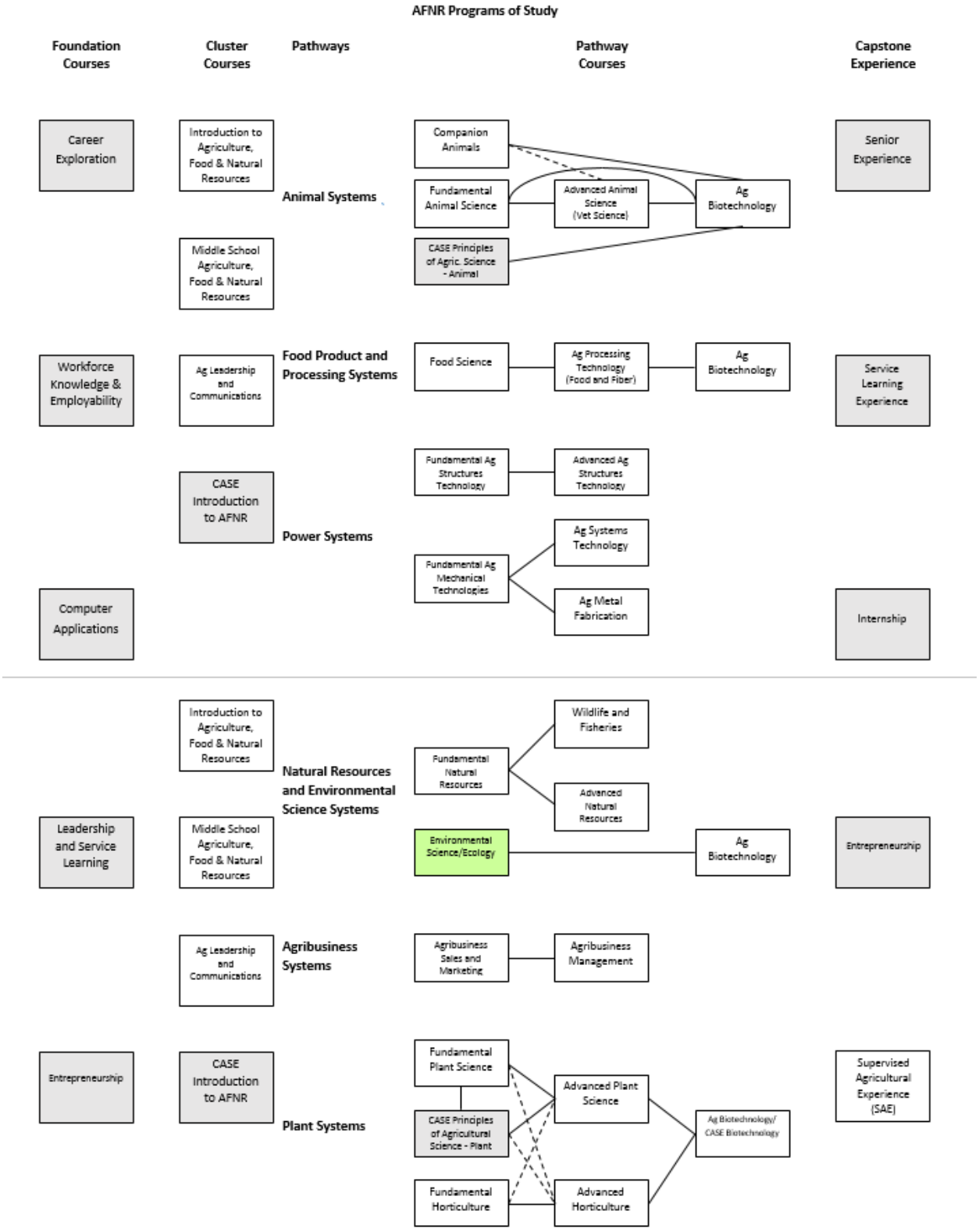


Information was provided about what makes good standards. These criteria included:

- Essential – does it define knowledge and skills that an individual must have to participate fully and effectively in programs that prepare them to enter careers with livable salaries, and to engage in career advancement in growing, sustainable industries?
- Rigorous – does it ask a student to demonstrate deep conceptual understanding through the application of knowledge and skills to new situations?
- Clear and specific – does it convey a level of performance without being overly prescriptive? Is it written in a way that the general public would understand?
- Teachable and Learnable – does it provide guidance to the development of curricula and instructional materials? Is it reasonable in scope?
- Measurable – Can it be determined by observation or other means that the student has gained the knowledge and skills to be demonstrated to show attainment of the standard?
- Coherent – Does it fit within the progression of learning that is expected for the program of study?
- Sequential – Does it reinforce prior learning without being unnecessarily repetitive? Does it provide knowledge and skills that will be useful as the student continues through the program of study?
- Benchmarked – Can the standard be benchmarked against industry or international standards? Does it prepare the student to be successful in the regional, state and global economies?

State agency staff met in May of 2015 to review the processes to be used for standards review. During that session the staff identified other criteria to be considered when writing standards:

- Connections to postsecondary programs
- Relevant across the content area
- Compatible with virtual learning
- Reflects business/industry input
- Adaptable to change over time
- Allows for instructional creativity
- Appropriate for the target audience
- Aligned with relevant academic content
- Applicable to student organizations
- Recognizes unique features of CTE

These additional criteria were shared with participants for their consideration during standards development, and an exercise was conducted in which participants individually, and then as a group, reviewed four sample standards.

Brief mention was made of resources available in the Dropbox in which members shared information. Because an introductory video regarding the Dropbox had been prepared and reviewed by participants prior to participation in the standards review team, the Dropbox review conducted here only showed categories of information provided in the general section and note that a Working Drafts folder would be created in which participants would store their work.

A Standards Template was shared with the participants and reviewed:

- The course title was inserted at the top.
- A grid of administrative information was completed to the extent the information was known. This grid included:
    - The Career Cluster [Agriculture, Food & Natural Resources]
    - The Course Code [to be added by state staff if not known]

    - Any prerequisites or recommended prior coursework
    - Credits [generally established by the individual school district]
    - Graduation requirement [generally established by the individual school district]
    - Program of study and sequence [a listing of the components of the program of study]
    - Student organization options
    - Coordinating work-based learning appropriate for the course
    - Industry certifications [if appropriate for the course]
    - Dual-credit or dual enrollment options if available
    - Teacher certification requirements [to be completed by state staff]
    - Resources
- Course description. Eventually this will be an executive summary describing the course, but in the process participants were encouraged to develop a "big picture" statement about the course to serve as a reminder when developing standards.
- Program of study application: a more detailed description of the elements within the program of study and where the particular course fits within a sequence.
- Course Standards and prods
    - "Prods" is a list of topics to keep in mind when developing standards to see that related topics are included. The prods identified by state staff include:
        - Safety
        - Soft skills
        - Reinforcing academic concepts in math, language arts, science and social studies
        - Addressing all aspects of the industry
        - Trends [so that students are thinking of the direction that an industry is moving]
    - Indicators – the main topics written in terms of a demonstration of knowledge and skills
    - Sub-indicators – statements identifying in more detail how the indicator will be demonstrated
    - Integrated content – A space that allows for examples, explanation, reference to credentials, alignment with other academic standards or other useful information to bring clarity to the understanding about the intent of the sub-indicator
    - Notes – a place for additional information to clarify the intent and expectations of the indicator.

An example was shared to ensure understanding.

Working teams were then established to write the standards. Teams were grouped generally by pathway. Each team selected a course to begin their work. Early drafts were reviewed by the consultants and participants were led with guiding questions so that they could refine their own work. Eventually, when standards had been developed for all courses, the participants did a final group review of all standards to give their approval. Final documents were then reviewed by the consultants for format and structure, and saved to the shared Dropbox. Participants were given two weeks to make any final comments or suggestions, at which time the Dropbox was put into a "read-only" status.

For Agriculture, Food and Natural Resources the following course standards were developed:

Cluster Courses

Introduction to Agriculture, Food & Natural Resources

Examine the role of FFA in agricultural education programs.

Summarize the history and organization of FFA

Explore opportunities in FFA

Demonstrate proper use of parliamentary procedure

Describe the types of Supervised Agricultural Experiences.

Evaluate the benefits and types of SAE programs

Develop a profile within Ag Career Network or Ag Experience Tracker

Discuss the concept of natural resources.

Classify different types of natural resources in order to enable protection, conservation, enhancement, and management in a particular geographical region

Describe the animal science industry.

Examine the animal science industry

Analyze historic and current trends impacting the animal science industry

Describe plant structure and function.

Examine the plant science industry

Analyze historic and current trends impacting the plant science industry

Summarize basic economic principles.

Apply management planning principles in the AFNR business

Discuss basic food science technology.

Illustrate how raw commodities become table-ready food products

Use basic principles of agricultural systems technology.

Execute basic principles involved in agricultural systems technology

Develop employability skills related to the AFNR cluster.

Develop soft skills to enhance employability

Middle School Agriculture, Food & Natural Resources

Examine agriculture industries of the past, present, and future.

Appraise fundamentals of the agriculture industry and its impact on the world

Explore the animal science industry including large and/or small animals

Explore the plant science industry including agronomic and/or horticultural crops

Use basic principles of agricultural systems technology.

Identify and demonstrate safe use of shop equipment

Develop employability skills related to the AFNR Cluster.

Develop soft skills to enhance employability

Ag Leadership and Communications

Act as a responsible and contributing citizen and employee in the AFNR sector. (National AFNR CRP.01)

Model personal responsibility in the workplace and community

Demonstrate soft skills for career success

Apply appropriate academic and technical skills

Apply and model teamwork and leadership skills in work groups.

Employ leadership skills to accomplish a team goal

Model proper use of basic parliamentary procedure

Exhibit a cooperative spirit when working in a group situation

Contribute to team-oriented projects and build consensus to accomplish results using cultural global competence in the workplace and community

Model integrity, ethical leadership and effective management. (National AFNR CRP.09)

Model characteristics of ethical and effective leaders in the workplace and community

Implement personal management skills to function effectively and efficiently in the workplace

Demonstrate behaviors that contribute to a positive morale and culture in the workplace and community

Communicate information relevant to agriculture clearly, effectively, and with reason. (National AFNR CRP.04)
- Demonstrate basic information research skills and techniques
- Produce clear, reasoned, and coherent written, verbal, or visual communication for formal or informal settings
- Communicate using strategies that ensure clarity, logic, purpose, and professionalism in formal or informal settings

Use technology to enhance productivity. (National AFNR CRP.11)
- Research, select, and use new technologies, tools, and applications to maximize productivity in the workplace and community
- Utilize technology to advocate for agriculture and the FFA
- Evaluate personal and organizational risks of technology use and take actions to prevent or minimize risks in the workplace and community

Animal Systems Pathway

Companion Animals

Examine the anatomy and physiology of small animals.
- Use classification systems to explain the anatomy and physiology of companion animals
- Differentiate between species' reproductive cycles
- Analyze elements between male and female reproductive systems

Evaluate an animal's diet to provide proper nutrition and optimal performance.
- Evaluate an animal's developmental stage to comprehend differences in nutrient requirements throughout the animal's life cycle
- Analyze a feed label/ration to determine whether it fulfills a given animal's nutrient requirements

Demonstrate techniques for optimal care of an animal.
- Recognize optimum performance for a given animal species
- Evaluate an animal's behavior to safely work with it
- Design a program to develop an animal to its highest potential

Develop employability skills related to the Animal Systems Pathway.
- Develop soft skills to enhance employability

Fundamental Animal Science

Examine animal anatomy and physiology.
- Recognize animals by species, gender or use
- Identify the parts of an animal's anatomy

Examine animal health.
- Evaluate a subject animal to determine the nature of its health
- Understand proper usage and effects of animal health products

Describe practices for safely working with animals.
- Judge an animal's behavior to safely work with it
- Examine animal housing, equipment and handling facilities for the safety of animals and handlers
- Select management practices to reduce the effects of animal production on the environment

Distinguish elements of proper animal nutrition.
- Compare an animal's differing nutritional needs throughout its life cycle
- Prepare a feed ration to fulfill a given animal's nutrient requirements

Study the reproductive system of animals.
- Examine male and female reproductive systems

Discuss reproductive cycles and breeding techniques
Evaluate an animal to determine breeding soundness and readiness

Identify factors that affect an animal's performance.
Predict genetic outcomes
Determine optimum performance levels for a given animal species
Assess an animal to determine if it has reached its optimum performance level

Examine animal industry issues.
Compare and contrast consumer concerns related to animal food products
Analyze consumer concern related to animal welfare

Develop employability skills related to the Animal Systems Pathway.
Develop soft skills to enhance employability

Advanced Animal Science

Select proper health care practices for animals.
Choose prevention and treatment programs for animal diseases, parasites and disorders
Discuss how to provide biosecurity for animals, people, and facilities

Develop proper nutrition management practices to optimize animal performance.
Assess nutritional elements as they affect animal performances
Assemble feed rations to provide for animals' nutritional needs

Select reproductive practices to optimize animal production.
Identify management practices in breeding that account for high quality animals

Articulate medical terminology as it relates to animals.
Recognize relevant medical terminology related to animals
Apply medical terminology in the correct context

Classify, evaluate and select animals based on anatomical and physiological characteristics (National AFNR AS.06).
Apply principles of anatomy and physiology to uses within various animal systems
Identify and explain the relationships among the various systems of the body

Utilize principles of surgical techniques.
Identify surgical tools and supplies
Apply proper surgical techniques to medical situations

Develop employability skills related to the Animal Systems Pathway.
Develop soft skills to enhance employability

Ag Biotechnology

Assess factors that have influenced the evolution of biotechnology in agriculture. [National AFNR BS.01.
Investigate and explain the relationships among past, current and emerging applications of biotechnology in agriculture
Evaluate the scope and implications of regulatory agencies on applications of biotechnology in agriculture and protection of public interests
Analyze the relationships and implications of bioethics, laws and public perceptions on applications of biotechnology in agriculture

Illustrate the functions and importance of biotechnology at the cellular level.
Recognize components of cells and their application to genetic improvement
Illustrate the role of cell structures in genetic theory

Safely apply appropriate skills to complete tasks in a biotechnology research and development environment.

Read, document, evaluate and secure accurate laboratory records of experimental protocols, observations and results
Implement standard operating procedures (SOP) for the biotechnology sector

Analyze the application of biotechnology to solve problems in Agriculture, Food and Natural Resources (AFNR) systems. National AFNR BS.03
Investigate biotechnology principles, techniques and processes to enhance plant systems
Investigate biotechnology principles, techniques and processes to enhance animal systems
Investigate biotechnology principles, techniques and processes to enhance food products and processing systems
Investigate biotechnology principles, techniques and processes to enhance natural resources and environmental service systems

Develop employability skills related to the Animal, Food Product and Processing, Plant, and Natural Resources and Environmental Science Systems.
Develop soft skills to enhance employability

Food Product and Processing Pathway

Food Science

Examine the makeup of the food industry.
Investigate advancements in food science techniques
Identify organizations and their impact on the food industry

Apply safety and sanitation procedures for food production.
Describe proper safety and sanitation practices when working with food products
Apply safety and sanitation practices used in the food industry
Identify origins of food borne pathogens and effective prevention and control methods

Apply principles of science to producing safe, wholesome and nutritious food products.
Apply fundamental chemistry to food science
Differentiate the makeup of food products
Develop a food product that meets the standards of regulatory agencies

Develop employability skills related to the Food Product and Processing Systems.
Develop soft skills to enhance employability

Ag Processing Technology

Examine the makeup of the food processing industry.
Investigate the evolution of the food processing industry
Discuss how food safety is addressed in the food processing industry
Explain how regulatory agencies in the food industry work to protect consumers

Demonstrate operational procedures used in the food industry.
Translate regulatory procedures as they apply to food processing
Demonstrate worker safety procedures for food processing equipment

Process foods for storage, distribution and consumption.
Classify processed food products
Utilize industry harvesting, selection and inspection techniques
Describe the steps involved with producing various food products
Process food safely

Develop employability skills related to the Food Product and Processing Systems.
Develop soft skills to enhance employability

Ag Biotechnology
[See Animal Systems pathway]

Power Systems Pathway
Fundamental Ag Structures Technology
Use safe practices associated with agriculture structures.
- Demonstrate safe use of tools and equipment while constructing agriculture structures

Develop plans for an agriculture structure project.
- Use computer skills or drafting tools to develop sketches and plans for an ag structure

Examine various materials required for an agricultural structure.
- Investigate the differences in materials needed to assemble an ag structure
- Demonstrate knowledge of structural materials by developing a supply list, along with cost estimates for a given project

Construct an agriculture structure.
- Assemble components of a structure
- Create a complete agriculture structure by combining individually constructed components

Demonstrate electrical principles.
- Explain basic electrical terms and principles
- Use applicable instruments to demonstrate knowledge of basic electricity
- Demonstrate wiring and electrical applications

Analyze properties and conditions of building site prior to construction.
- Explain legal land descriptions and plat maps
- Examine geographical characteristics of building site
- Operate surveying equipment

Analyze various concrete and masonry concepts.
- Identify tools and materials used in concrete and masonry projects

Explore career opportunities in agricultural structures and mechanics.
- Investigate career opportunities that pertain to agricultural structures
- Develop soft skills to enhance employability

Advanced Ag Structures Technology
Use safe practices when planning, maintaining, and constructing agricultural structures.
- Demonstrate safe use of tools and equipment while constructing agriculture structures
- Demonstrate understanding of tool repair and maintenance

Service and repair mechanical equipment and structures.
- Analyze schematics to service various systems in an ag structure

Utilize a structural plan that meets specifications and building codes.
- Examine blueprints and local codes that identify required components of an ag structure
- Design a construction plan for an agricultural structure

Use plans to guide construction of agricultural structures.
- Use architectural and mechanical plans to construct agricultural buildings or facilities

Apply a variety of concrete and masonry concepts to various projects.
- Demonstrate concrete and masonry procedures

Investigate a variety of plumbing tools and products.
- Identify tools and materials used for plumbing
- Demonstrate various plumbing techniques

Develop employability skills related to the Power, Structural, and Technical Systems Pathway.
- Develop soft skills to enhance employability

Fundamental Ag Mechanical Technologies

Apply safety practices in mechanical applications.
- Explain the safe operation and servicing of machinery and equipment
- Demonstrate safe operation of construction/fabrication tools

Identify maintenance procedures & schedules for mechanical equipment, power and agricultural technology.
- Identify parts and explain functions of various mechanical systems
- Investigate common maintenance schedules and practices for equipment
- Troubleshoot problems in mechanical systems

Demonstrate basic skills in project planning and metal fabrication.
- Create sketches of metal projects
- Demonstrate basic welding principles and techniques
- Employ metal fabrication principles to create a metal project

Apply electrical principles in agricultural applications.
- Recognize the components and functions of electrical systems
- Demonstrate fundamental principles of electricity

Investigate emerging agricultural technologies.
- Investigate new and/or existing technology in agriculture

Develop employability skills related to the Power, Structural, and Technical Systems Pathway.
- Develop soft skills to enhance employability

Ag Systems Technology

Apply engineering principles to mechanical equipment, power utilization and technology.
- Compare power generation from various energy sources
- Investigate various properties of lubricants needed in ag mechanics

Apply principles of operation and maintenance to mechanical equipment, power utilization, and technology.
- Explain the importance of scheduled service routines to maintain machinery and equipment
- Demonstrate suggested inspections on machinery and/or equipment

Examine principles of service and repair to mechanical and electrical equipment, power utilizations and technology.
- Evaluate internal combustion engines to assess needed service and repair
- Investigate service and repair specifications for operating systems
- Diagnose problems associated with operating systems
- Explore electric motor types, operation and maintenance

Analyze emerging agriculture technologies.
- Analyze how emerging agriculture technologies have affected AFNR industries

Develop employability skills related to the Power, Structural, and Technical Systems Pathway.
- Develop soft skills to enhance employability

Ag Metal Fabrication

Demonstrate the basics of metal fabrication.
- Demonstrate knowledge of metal fabrication techniques and related technologies
- Prepare various metals for welding
- Create plans for metal project construction

Demonstrate the principles of Shielded Metal Arc Welding (SMAW) and the correct operation of SMAW equipment.

Perform Shielded Metal Arc Welding (SMAW) techniques

Demonstrate the principles of Metal Inert Gas (MIG) welding, also known as Gas Metal Arc Welding (GMAW), and the correct operation of MIG equipment.

Perform metal inert gas (MIG) welding techniques

Understand the correct operation of oxyacetylene equipment.

Explore oxyacetylene welding, cutting, and brazing

Explore advanced welding processes.

Investigate and explain principles of advanced welding processes (e.g. Tungsten Inert Gas (TIG) welding, plasma cutting)

Develop employability skills related to the Power, Structural, and Technical Systems Pathway.

Develop soft skills to enhance employability

Investigate careers related to metal fabrication

Natural Resources and Environmental Systems Pathway

Fundamental Natural Resources

Examine the importance of resource and human interrelations to conduct management activities in natural habitats.

Explain resource management components to establish or enhance relationships in natural resource systems

Apply Geographic Information Systems (GIS) skills to natural resource activities

Examine planning data to determine natural resource status

Discuss weather and other criteria to recognize dangers related to work in an outdoor environment

Interpret scientific principles of natural resource management activities.

Identify and classify plant- and animal-based natural resources

Identify natural cycles and related phenomena to describe ecologic concepts and principles

Describe soil compositions and properties

Examine wetland, watershed and groundwater properties, classifications and functions

Discuss forestry management techniques

Describe production practices and processing procedures for natural resources

Describe how natural resource products are produced, harvested, processed and used

Explain responsible practices to protect natural resources

Describe techniques and equipment needed to manage and conserve natural resources

Discuss animal and plant disease symptoms and prevention

Recognize insect types and available controls to prevent insect infestation

Wildlife and Fisheries

Demonstrate the importance of fish and wildlife management, including their respective habitats. (National AFNR NRS.02)

Apply knowledge of natural resource components to the management of wildlife and fish

Identify fish and wildlife species

Identify healthy habitat for wildlife and fish

Identify economic and social issues related to fish and wildlife (National AFNR NRS.03)

Discuss hunting/harvesting fish and wildlife species as a management technique

Demonstrate processing techniques to use game and fish as food sources

Distinguish safety practices related to hunting and fishing activities

Compare life patterns of fish and wildlife.

Differentiate fish and wildlife function and form in their daily lives

- Identify seasonal rituals of fish and wildlife species
- Diagnose wildlife and fish diseases

Investigate careers in wildlife and fisheries conservation.

- Locate, identify, research and interpret career information
- Compare and contrast characteristics of various careers

Advanced Natural Resources

Explore soil composition and soil management.

- Demonstrate techniques used to classify soils
- Explain the reasons for, and importance of, soil conservation
- Analyze soils for agricultural and homesite uses
- Analyze existing soil surveys to develop effective management plans

Apply ecological concepts and principles to rangeland conservation.

- Summarize the interrelationships of rangeland management, the environment, wildlife management, and the livestock industry
- Discuss practices used to improve rangeland quality
- Analyze the carrying capacity in various rangelands for both wildlife species and domestic livestock
- Identify plants important to quality rangeland and determine rangeland condition

Understand forest management practices.

- Identify trees and classify to species
- Apply silvicultural practices: planting, thinning, and harvesting
- Identify and classify Forest Site Indices as related to Sustained Yield concepts
- Define and discuss Multiple Use management
- Develop a Continuous Forest Inventory

Apply ecological concepts and principles to fisheries and wildlife in natural resources.

- Identify similarities and differences among wildlife and fish species, along with identifying the keystone species in a system
- Investigate wildlife management and habitat
- Differentiate among a variety of management practices used to manage wildlife populations for hunting and other recreational purposes
- Enhance fish/wildlife habitat

Understand air and water use, examine management practices, and develop conservation strategies.

- Explain the government's role in regulating air and water management practices and conservation strategies
- Define appropriate water conservation measures
- Analyze the way in which water and air management affect the environment and human needs
- Measure and assess water and air quality parameters using federal, tribal, state and/or local standards

Develop plans to ensure sustainable production and processing of natural resources. (National NRS.03)

- Sustainably produce, harvest, process and use natural resource products (e.g., forest products, wildlife, minerals, fossil fuels, shale oil, alternative energy, recreation, aquatic species, etc.)
- Compare the various production methods of alternative energy sources, both renewable and non-renewable, and their relations to economic, environmental and social sustainability
- Evaluate methods used to extract and process minerals for economic, environmental, and social sustainability

Ag Biotechnology

[See Animal Systems pathway]

Agribusiness Systems Pathway

Agribusiness Sales and Marketing

Demonstrate the skills necessary to obtain and keep gainful employment in agribusiness occupations.
- Use written and oral skills to seek and obtain an agricultural job
- Use marketable skills such as reliability and communications to improve self and to develop steps for systematic problem solving

Evaluate sales and marketing principles used to accomplish marketing objectives.
- Write a marketing plan for a product based on marketing objectives
- Merchandise products and services to meet the needs of a customer

Use technology and documents to manage agribusiness inventory.
- Apply reading comprehension, writing and math skills in inventory management
- Analyze inventory data to determine acceptable business inventory stocking levels to manage business efficiency

Evaluate opportunities for marketing of agricultural products throughout the world.
- Locate areas of agricultural importance and determine the competitive advantage for production of agricultural products
- Develop an awareness of food production and global needs to determine how those needs can be met
- Investigate the process in developing international trading partners

Use sales and marketing principles to accomplish AFNR business objectives (Nat #5).
- Analyze the roles of markets, trade, competition and price in relation to an AFNR business sales and marketing plan
- Assess and apply sales principles and skills to accomplish AFNR business objectives
- Assess marketing principles and develop marketing plans to accomplish AFNR business objectives

Agribusiness Management

Introduce the components of agribusiness management.
- Explain key business types and management principles and issues for the agribusiness enterprise
- Present an overview of the knowledge and skills needed to work effectively within the agribusiness enterprises
- Demonstrate leadership skills to accomplish goals and objectives in an agribusiness environment

Use record keeping to accomplish AFNR business objectives, manage budgets and comply with laws and regulations. (National AFNR.03)
- Distinguish key accounting fundamentals to accomplish dependable bookkeeping and associated files
- Analyze and interpret agricultural policies in relation to their effects on the agribusiness management and agribusiness enterprises

Plan a marketing program utilizing various methods for sales of agricultural products. (National AFNR ABS.05)
- Explore strategies for optimum marketing of agricultural commodities
- Analyze budget and forecast models to determine optimal business marketing, strategies, and performances

Manage cash budgets, credit budgets, and credit for an AFNR business using generally accepted accounting principles (GAAP). (National #3)
- Develop, assess and manage cash budgets to achieve AFNR business goals
- Analyze credit needs and manage credit budgets to achieve AFNR business goals

Plant Systems Pathway

Fundamental Plant Science

Explain principles of anatomy and physiology in plants.
- Describe functional differences in plant structures including roots, stems, flowers, leaves, and fruits
- Classify and identify plants

Manipulate the environment to promote optimal growth in plants.
- Determine nutritional requirements for optimal plant growth
- Examine data to evaluate and manage soil/media and nutrients

Evaluate fundamentals of production and harvesting of plants.
- Analyze a production plan for optimal plant production
- Compare the basic methods for reproducing and propagating plants
- Examine fundamentals to harvest, handle, store, and market crops

Explore employability skills within the plant science industry.
- Develop soft skills to enhance employability

Fundamental Horticulture

Explain horticultural plant classifications.
- Classify and identify horticultural plants

Define basic principles of plant physiology and propagation.
- Explain basic principles of plant physiology and growth
- Demonstrate the propagation of plants by sexual and asexual methods

Describe pest management in the horticultural industry.
- Identify principles of pest management

Analyze soil, environment, and fertility properties as they affect plant growth.
- Examine soil and planting media management
- Examine the growing environment and its effect on plant growth
- Identify plant nutrition practices for horticulture plants as they relate to plant growth and health

Examine horticulture industry sectors.
- Investigate the care and maintenance of vegetable/fruit crops
- Investigate the floriculture industry
- Investigate the nursery/landscape industry
- Investigate the care and management of turf grass

Develop employability skills related to the Plant Systems Pathway.
- Develop soft skills to enhance employability

Advanced Plant Science

Recognize principles of plant anatomy, classification, and physiology for the production and management of agronomic plants.
- Classify plants according to taxonomy, life cycles, and plant use
- Compare the benefits and risks of genetically modified plants (GMO)
- Apply knowledge of seed, fruit, and vegetative parts optimal for plant reproduction

Employ the principles and practices of sustainable agriculture in a plant-based operation.
- Incorporate the fundamentals of plant management and sustainable agriculture
- Evaluate a fertilizer plan for specific plants or crops
- Evaluate data to manage range and pastures
- Examine growth of a plant to determine when and how a crop should be harvested and stored
- Evaluate crop and harvest success for future planning

Analyze a pest management system.

Identify pest chemicals by formulation and use
Develop integrated pest management strategies to manage pest populations
Understand the safe handling, mixing and application of chemicals

Develop employability skills related to the Plant Systems Pathway.
Develop soft skills to enhance employability

Advanced Horticulture

Identify equipment and materials utilized in the horticulture industry.
Identify tools and equipment used in horticultural industries
Identify supplies and materials used in horticulture

Develop a plan for utilizing horticultural plants and materials.
Design a landscaping plan based on design elements and principles
Construct floral arrangements using basic principles and elements of design
Develop a greenhouse management plan

Demonstrate the importance of managing plant growth and use.
Select landscaping plants based on quality and function
Select and manage plant materials for the floricultural industry
Investigate methods for controlling greenhouse environment to meet plant growth needs
Demonstrate the relationships among growing media, plant nutrition, and environmental conditions as they relate to plant growth and reproduction
Discuss principles of specialized growing techniques

Manage and maintain horticulture plants and equipment.
Summarize the installation and maintenance of turf grass and necessary equipment
Manage and maintain nursery/landscape plants and equipment
Manage and maintain floral and foliage plants and floriculture equipment
Maintain controls for the greenhouse environment, structure, and plants

Develop employability skills related to the Plant Systems Pathway.
Develop soft skills to enhance employability

Ag Biotechnology

[See Animal Systems pathway]

A cover letter has been drafted to guide business/industry feedback to the standards developed through this process. The seven standards documents will be reformatted with three columns for business/industry feedback at the sub-indicator level utilizing a 1 (low) to 5 (high) scale:

- Is the sub-indicator essential?
- Is the sub-indicator clear and specific?
- Is the sub-indicator measurable?

Business/industry partners are also asked if the standards reflect the preparation necessary for a student to enter her/his particular occupational field. A sample of the reformatted document follows.

Course Standards

ITA 1 Examine the role of FFA in agricultural education programs.

			Essential 1 (low) – 5 (high)	Clear and Specific 1 (low) – 5 (high)	Measurable 1 (low) – 5 (high)
Webb Level	*Sub-indicator*	*Integrated Content*			
One Recall	ITA 1.1 Summarize the history and organization of FFA.				
One Recall	ITA 1.2 Explore opportunities in FFA.				
Two Skill/Concept	ITA 1.3 Demonstrate proper use of parliamentary procedure.				

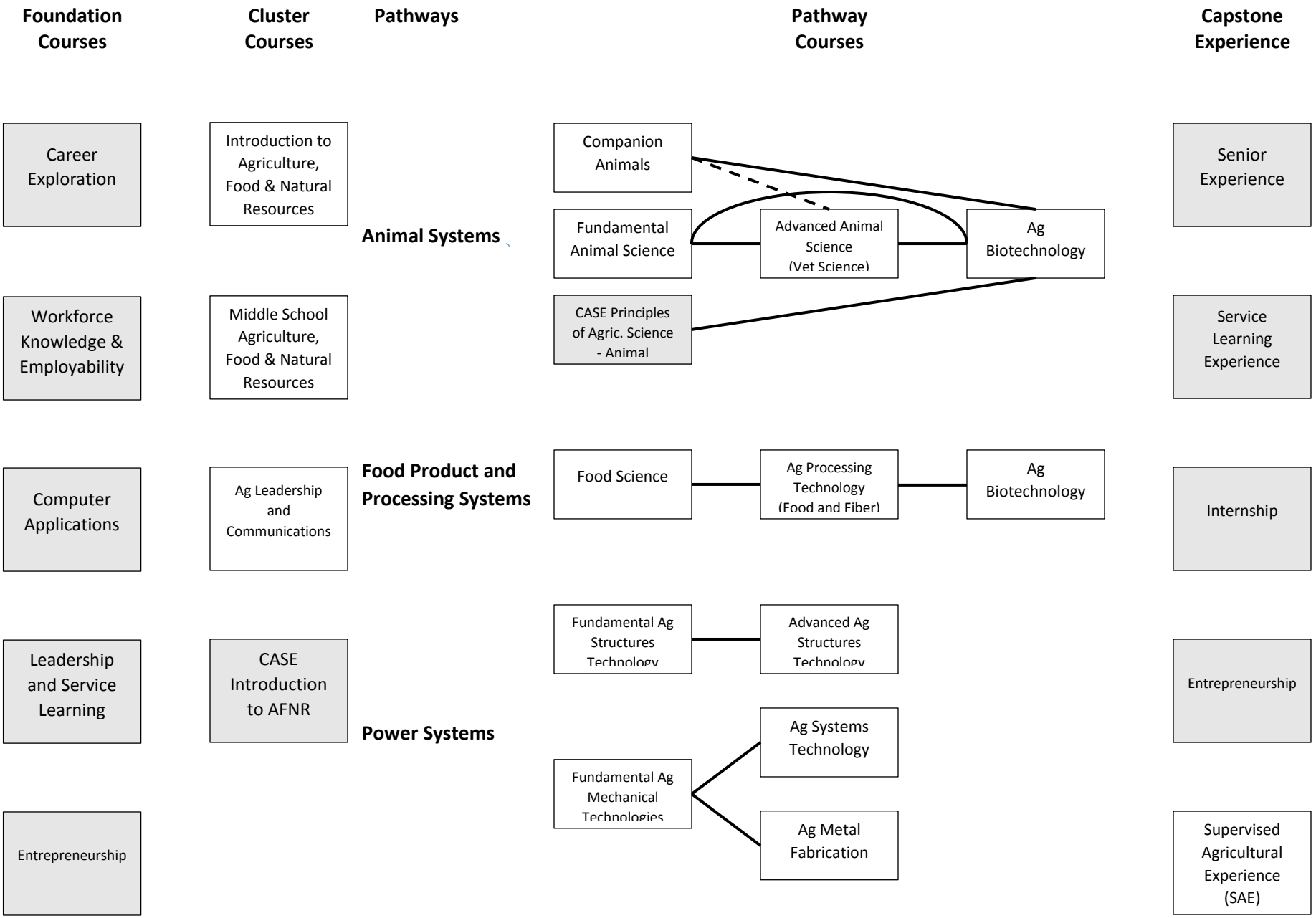
Notes

ITA 2 Describe the types of Supervised Agricultural Experiences.

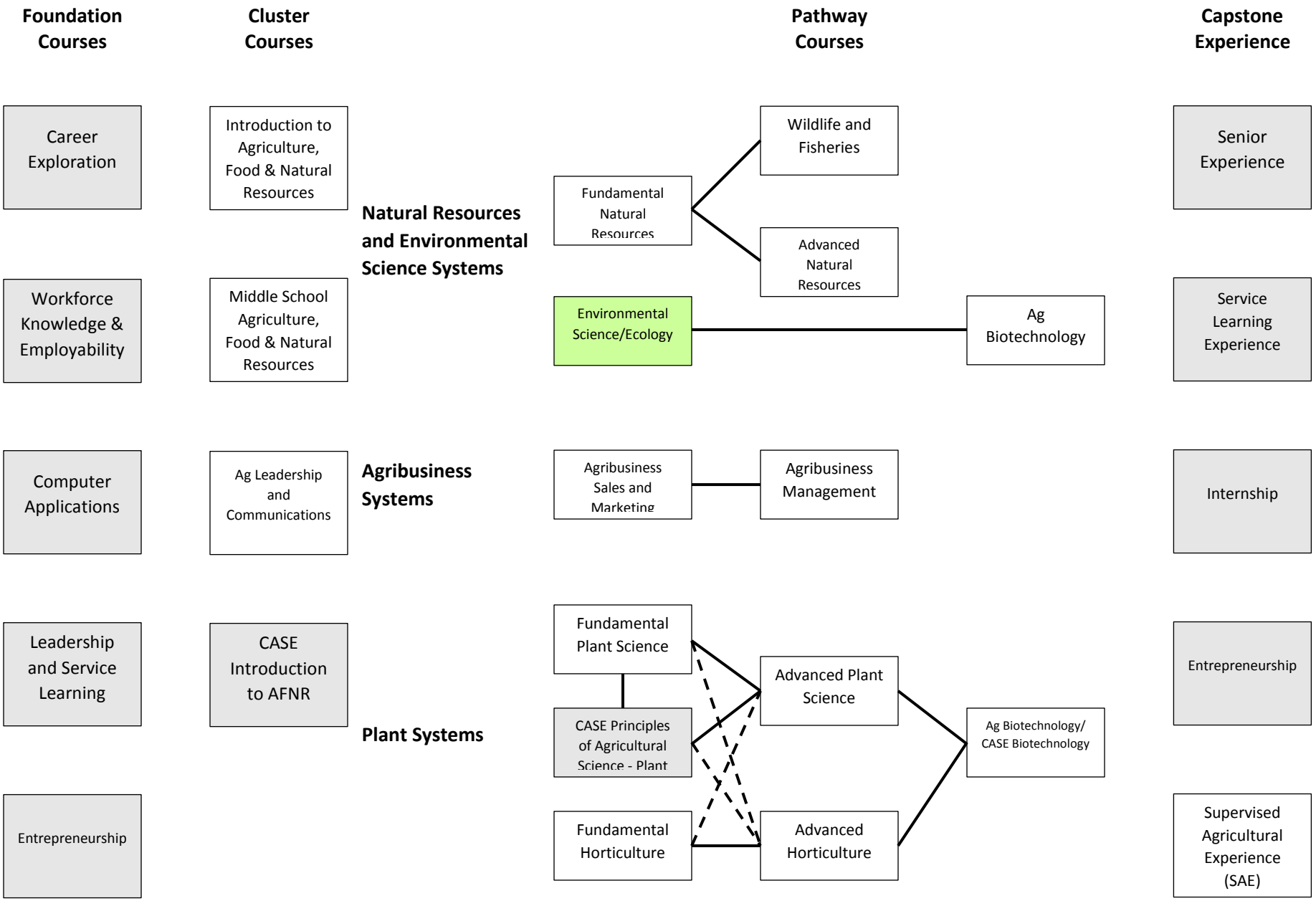
			Essential 1 (low) – 5 (high)	Clear and Specific 1 (low) – 5 (high)	Measurable 1 (low) – 5 (high)
Webb Level	*Sub-indicator*	*Integrated Content*			
One Recall	ITA 2.1 Evaluate the benefits and types of SAE programs.				
Three	ITA 2.2 Develop a profile within Ag Career Network or Ag Experience Tracker.				

Following business/industry review, state staff will revise the standards documents as necessary to incorporate business/industry suggestions. The revised documents will be shared with participants in the standards development process and, eventually, with teachers of agriculture, food and natural resources courses throughout the state for their feedback. Final documents will be taken through public hearings and delivered to the State Board of Education for adoption.

AFNR Programs of Study



AFNR Programs of Study (continued)



south dakota DEPARTMENT OF EDUCATION
Learning. Leadership. Service.

Middle School AFNR

Career Cluster	Agriculture, Food and Natural Resources
Course Code	18000
Prerequisite(s)	None
Credit	.5 or 1
Graduation Requirement	No
Program of Study and Sequence	Foundation Course – **Middle School Agriculture, Food & Natural Resources** – Pathway Course
Student Organization	National FFA Organization
Coordinating Work-Based Learning	Job shadowing, mentoring, service learning, workplace tours, school-based enterprises, Supervised Agricultural Experience (SAE)
Industry Certifications	OSHA 10 Hour Safety Certification (Agricultural, Construction Industry, or General Industry)
Dual Credit or Dual Enrollment	
Teacher Certification	Agriculture Education
Resources	

Course Description:

Middle School Agriculture, Food and Natural Resources allows students to study a variety of agricultural topics throughout the six Agriculture, Food, and Natural Resources pathways. It serves as an introduction to much of the coursework included within the AFNR cluster. Middle school courses are different across the state, regarding the grade levels and length of time of the course. The following standards should be covered to meet the needs of the program. Additional topics can be covered to meet the demands of specific time grade levels and time frames. Students are encouraged to explore opportunities within the national FFA organization and develop a supervised agricultural experience program. Application of clinical and leadership skills are provided by participating in FFA activities, conferences, and skills competitions such as the Career Development Events and proficiency awards. Classroom and laboratory content may be enhanced by utilizing appropriate equipment and technology. Algebra, Biology, English and human relations skills will be reinforced in the course.

Program of Study Application

Middle School Agriculture, Food & Natural Resources is a cluster course in the Agriculture, Food and Natural Resources Cluster. Middle School Agriculture, Food & Natural Resources would be preceded by a Foundation Course and will prepare a student to enter a pathway course in any of the Agriculture, Food & Natural Resources pathways.

Career Cluster: AFNR

Course: Middle School AFNR

Course Standards

MSA 1: Establish an understanding of the three main parts of the agricultural education program.

Webb Level	*Sub-indicator*	*Integrated Content*
One Recall	MSA 1.1: Define Supervised Agricultural Experience Program.	
One Recall	MSA 1.2: Explore opportunities in the National FFA Organization.	
One Recall	MSA 1.3: Demonstrate an understanding of Agricultural Education.	

Notes:

Career Cluster: AFNR

Course: Middle School AFNR

MSA 2: Express the importance of agriculture in daily life.

Webb Level	*Sub-indicator*	*Integrated Content*
One Recall	MSA 2.1: Give examples of how the agriculture industry provides basic human needs (food, clothing, shelter).	
Three Strategic Thinking	MSA 2.2: Discuss how the skills needed for agricultural work have evolved.	
Two Skill/Concept	MSA 2.3: Summarize the importance of agriculture to South Dakota's economy.	

Notes:

Career Cluster: AFNR

Course: Middle School AFNR

MSA 3: Examine agriculture industries of the past, present, and future.

Webb Level	*Sub-indicator*	*Integrated Content*
Two Skill/Concept	MSA 3.1: Appraise fundamentals of the agriculture industry and its impact on the world.	
One Recall	MSA 3.2: Explore the animal science industry including large and/or small animals.	
One Recall	MSA 3.3: Explore the plant science industry including agronomic and/or horticultural crops.	

Notes:

Career Cluster: AFNR

Course: Middle School AFNR

MSA 4: Use basic principles of agricultural systems technology.

Webb Level	*Sub-indicator*	*Integrated Content*
Two Skill/Concept	MSA 4.1: Identify and demonstrate safe use of shop equipment.	

Notes:

MSA 5: Develop employability skills related to the AFNR Cluster.

Webb Level	*Sub-indicator*	*Integrated Content*
Two Skill/Concept	MSA 5.1: Develop soft skills to enhance employability.	

Notes:

Introduction to AFNR (Agriscience)

Career Cluster	Agriculture, Food and Natural Resources
Course Code	18001
Prerequisite(s)	None
Credit	.5 or 1
Graduation Requirement	No
Program of Study and Sequence	Foundation Course – **Introduction to Agriculture, Food & Natural Resources** – Pathway Course
Student Organization	National FFA Organization
Coordinating Work-Based Learning	Job shadowing, mentoring, internships, entrepreneurships, service learning, workplace tours, apprenticeship, school-based enterprises, Supervised Agricultural Experience (SAE)
Industry Certifications	OSHA 10 Hour Safety Certification (Agricultural, Construction Industry, or General Industry
Dual Credit or Dual Enrollment	
Teacher Certification	Agriculture Education
Resources	

Course Description:

This course allows students to study a variety of agricultural topics throughout the six Agriculture, Food, and Natural Resources pathways. It serves as an introduction to much of the coursework included within the AFNR cluster. Application of clinical and leadership skills are provided by participating in FFA activities, conferences, and skills competitions such as the Career Development Events and proficiency awards. Classroom and laboratory content may be enhanced by utilizing appropriate equipment and technology. Algebra, biology, English and human relations skills will be reinforced in the course. Each student will be expected to maintain a Supervised Agricultural Experience (SAE).

Program of Study Application

Introduction to Agriculture, Food & Natural Resources is a cluster course in the Agriculture, Food and Natural Resources cluster. Introduction to Agriculture, Food & Natural Resources would be preceded by a Foundation Course, and would prepare a student to take a first-level course in any of the Agriculture, Food and Natural Resources pathways.

Career Cluster: AFNR

Course: Intro to AFNR

Course Standards

ITA 1 Examine the role of FFA in agricultural education programs.

Webb Level	*Sub-indicator*	*Integrated Content*
One Recall	ITA 1.1 Summarize the history and organization of FFA.	
One Recall	ITA 1.2 Explore opportunities in FFA.	
Two Skill/Concept	ITA 1.3 Demonstrate proper use of parliamentary procedure.	

Notes

ITA 2 Describe the types of Supervised Agricultural Experiences.

Webb Level	*Sub-indicator*	*Integrated Content*
One Recall	ITA 2.1 Evaluate the benefits and types of SAE programs.	
Three Strategic Thinking	ITA 2.2 Develop a profile within Ag Career Network or Ag Experience Tracker.	

Notes

ITA 3 Discuss the concept of natural resources.

Webb Level	*Sub-indicator*	*Integrated Content*
Two Skill/Concept	ITA 3.1 Classify different types of natural resources in order to enable protection, conservation, enhancement, and management in a particular geographical region.	

Notes

ITA 4 Describe the animal science industry.

Webb Level	*Sub-indicator*	*Integrated Content*
One Recall	ITA 4.1 Examine the animal science industry.	
Two Skill/Concept	ITA 4.2 Analyze historic and current trends impacting the animal science industry.	

Notes

ITA 5 Describe plant structure and function.

Webb Level	*Sub-indicator*	*Integrated Content*
One Recall	ITA 5.1 Examine the plant science industry.	
Two Skill/Concept	ITA 5.2 Analyze historic and current trends impacting the plant science industry.	

Notes

ITA 6 Summarize basic economic principles.

Webb Level	*Sub-indicator*	*Integrated Content*
Two Skill/Concept	ITA 6.1 Apply management planning principles in the AFNR business.	

Notes

ITA 7 Discuss basic food science technology.

Webb Level	*Sub-indicator*	*Integrated Content*
One Recall	ITA 7.1 Illustrate how raw commodities become table-ready food products.	

Notes

ITA 8 Use basic principles of agricultural systems technology.

Webb Level	*Sub-indicator*	*Integrated Content*
Two Skill/Concept	ITA 8.1 Execute basic principles involved in agricultural systems technology.	

Notes

ITA 9 Develop employability skills related to the AFNR cluster.

Webb Level	*Sub-indicator*	*Integrated Content*
Two Skill/Concept	ITA 9.1 Develop soft skills to enhance employability.	

Notes

Ag Leadership and Communications

Career Cluster	Agriculture, Food and Natural Resources
Course Code	18203
Prerequisite(s)	Recommended: Introduction to AFNR
Credit	0.5 or 1.0
Graduation Requirement	N
Program of Study and Sequence	Foundation Course – **Ag Leadership and Communications** – Pathway Course
Student Organization	National FFA Organization
Coordinating Work-Based Learning	Job shadowing, mentoring, internships, entrepreneurships, service learning, workplace tours, apprenticeship, school-based enterprises, Supervised Agricultural Experience (SAE)
Industry Certifications	OSHA 10 Hour Safety Certification (Agricultural, Construction Industry, or General Industry), National Career Readiness Certificate (NCRC)
Dual Credit or Dual Enrollment	
Teacher Certification	Agriculture Education
Resources	

Course Description:

The world population is expected to increase to 9 billion by 2050. The agricultural industry will need strong leadership to guide us to provide food, fiber and fuel for this growing population. Agricultural education prepares students for successful careers and a lifetime of informed choices in the global agriculture, food, fiber and natural resources systems. Agriculture Leadership and Communications will provide students with fundamental skills for success in agricultural careers and team environments. Students will investigate a variety of topics essential to communicating about the industry of agriculture. In addition to improving personal traits and career readiness, areas of study include interviewing, writing with or without using opinion, researching techniques, equipment and technology, and presentation of news and agricultural markets.

Opportunities for application of clinical and leadership skills are provided by participation in FFA activities, conferences and skills competition such as sales related career development events and proficiency awards. Each student will be expected to maintain a Supervised Agricultural Experience Program/Internship. English, Speech, and Human Relations skills will be reinforced in the course. Work-based learning strategies appropriate for this course are school-based enterprises, field trips, and internships.

Program of Study Application

Ag Leadership and Communications is a cluster course in the Agriculture, Food and Natural Resources cluster. Ag Leadership and Communications would be preceded by a Foundation Course, and would prepare a student to take a first-level course in any of the Agriculture, Food and Natural Resources pathways.

Course Standards

ALC 1 Act as a responsible and contributing citizen and employee in the AFNR sector. (National AFNR CRP.01)

Webb Level	*Sub-indicator*	*Integrated Content*
Level 4 Extended Thinking	ALC 1.1 Model personal responsibility in the workplace and community.	
Level 4 Extended Thinking	ALC 1.2 Demonstrate soft skills for career success.	
Level 2 Skill/Concept	ALC 1.3 Apply appropriate academic and technical skills.	

Notes

ALC 2 Apply and model teamwork and leadership skills in work groups.

Webb Level	*Sub-indicator*	*Integrated Content*
Level 4 Extended Thinking	ALC 2.1 Employ leadership skills to accomplish a team goal.	
Level 3 Strategic Thinking	ALC 2.2 Model proper use of basic parliamentary procedure.	
Level 2 Skill/Concept	ALC 2.3 Exhibit a cooperative spirit when working in a group situation.	
Level 2 Skill/Concept	ALC 2.4 Contribute to team-oriented projects and build consensus to accomplish results using cultural global competence in the workplace and community.	

Notes

ALC 3 Model integrity, ethical leadership and effective management. (National AFNR CRP.09)

Webb Level	*Sub-indicator*	*Integrated Content*
Level 2 Skill/Concept	ALC 3.1 Model characteristics of ethical and effective leaders in the workplace and community.	(e.g. integrity, self-awareness, self-regulation, etc.)
Level 3 Strategic Thinking	ALC 3.2 Implement personal management skills to function effectively and efficiently in the workplace.	(e.g., time management, planning, prioritizing, etc.)
Level 2 Skill/Concept	ALC 3.3 Demonstrate behaviors that contribute to a positive morale and culture in the workplace and community.	(e.g. positively influencing others, effectively communicating, etc.)

Notes

ALC 4 Communicate information relevant to agriculture clearly, effectively, and with reason. (National AFNR CRP.04)

Webb Level	*Sub-indicator*	*Integrated Content*
Level 1 Recall	ALC 4.1 Demonstrate basic information research skills and techniques.	
Level 4 Extended Thinking	ALC 4.2 Produce clear, reasoned, and coherent written, verbal, or visual communication for formal or informal settings.	
Level 3 Strategic Thinking	ALC 4.3 Communicate using strategies that ensure clarity, logic, purpose, and professionalism in formal or informal settings.	

Notes

ALC 5 Use technology to enhance productivity. (National AFNR CRP.11)

Webb Level	*Sub-indicator*	*Integrated Content*
Level 2 Skill/Concept	ALC 5.1 Research, select, and use new technologies, tools, and applications to maximize productivity in the workplace and community.	
Level 3 Strategic Thinking	ALC 5.2 Utilize technology to advocate for agriculture and the FFA.	
Level 4 Extended Thinking	ALC 5.3 Evaluate personal and organizational risks of technology use and take actions to prevent or minimize risks in the workplace and community.	

Notes

Companion Animals

Career Cluster	Agriculture, Food and Natural Resources
Course Code	18108
Prerequisite(s)	Recommended: Introduction to AFNR
Credit	0.5 of 1.0
Graduation Requirement	No
Program of Study and Sequence	Foundation course – Cluster course – **Companion Animals** – Advanced Animal Science and/or Ag Biotechnology
Student Organization	National FFA Organization
Coordinating Work-Based Learning	Job shadowing, mentoring, internships, entrepreneurships, service learning, workplace tours, apprenticeship, school-based enterprises, Supervised Agricultural Experience (SAE)
Industry Certifications	OSHA 10 Hour Safety Certification (General Industry), National Career Readiness Certificate (NCRC), Youth Humane Equine Management
Dual Credit or Dual Enrollment	
Teacher Certification	Agriculture Education
Resources	

Course Description:

Companion Animals will address the basic knowledge and skills necessary to care for and meet the needs of companion animals, along with soft skills necessary for careers in the Agriculture, Food and Natural Resources sector. Urban and rural students desire training in areas of animal care. Careers in the small animal industry are growing quickly. Utilizing appropriate equipment may enhance classroom and laboratory content, and technology, mathematics, English, biology and human relations skills will be reinforced in the course. Work-based learning strategies appropriate for this course are school-based enterprises and field trips. This class is reinforced through the FFA and SAE activities such as the Livestock Evaluation Career Development Event and related Proficiency Awards. Each student will be expected to maintain a Supervised Agricultural Experience (SAE).

Program of Study Application:

Companion Animals is a first pathway course in the Agriculture, Food and Natural Resources Program of Study, Animal Systems pathway. Companion Animals is preceded by a cluster course and is recommended to be taken prior to participation in Advanced Animal Science or Ag Biotechnology.

Course Standards

CA 1 Examine the anatomy and physiology of small animals.

Webb Level	*Sub-indicator*	*Integrated Content*
Three Applying	CA 1.1 Use classification systems to explain the anatomy and physiology of companion animals.	
Three Analyzing	CA 1.2 Differentiate between species' reproductive cycles.	
Three Analyzing	CA 1.3 Analyze elements between male and female reproductive systems.	

Notes

CA 2 Evaluate an animal's diet to provide proper nutrition and optimal performance.

Webb Level	*Sub-indicator*	*Integrated Content*
Three Evaluating	CA 2.1 Evaluate an animal's developmental stage to comprehend differences in nutrient requirements throughout the animal's life cycle.	
Three Analyzing	CA 2.2 Analyze a feed label/ration to determine whether it fulfills a given animal's nutrient requirements.	

Notes

CA 3 Demonstrate techniques for optimal care of an animal.

Webb Level	*Sub-indicator*	*Integrated Content*
Three Applying	CA 3.1 Recognize optimum performance for a given animal species.	
Three Evaluating	CA 3.2 Evaluate an animal's behavior to safely work with it.	
Three Applying	CA 3.3 Design a program to develop an animal to its highest potential.	

Notes

CA 4 Develop employability skills related to the Animal Systems Pathway.

Webb Level	*Sub-indicator*	*Integrated Content*
Two Develop	CA 4.1 Develop soft skills to enhance employability.	

Notes

Fundamental Animal Science

Career Cluster	Agriculture, Food and Natural Resources
Course Code	18101
Prerequisite(s)	Recommended: Introduction to AFNR
Credit	0.5
Graduation Requirement	No
Program of Study and Sequence	Foundation course – Cluster course – **Fundamental Animal Science** – Advanced Animal Science and/or Ag Biotechnology
Student Organization	National FFA Organization
Coordinating Work-Based Learning	Job shadowing, mentoring, internships, entrepreneurships, service learning, workplace tours, apprenticeship, school-based enterprises, Supervised Agricultural Experience (SAE)
Industry Certifications	OSHA 10 Hour Safety Certification (Agriculture or General Industry), National Career Readiness Certificate (NCRC), Beef Quality Assurance, Youth Beef Quality Assurance, Youth Beef Industry Food Safety, Youth Dairy Animal Care and Quality Assurance, Youth Humane Equine Management, Youth Pork Quality Assurance
Dual Credit or Dual Enrollment	
Teacher Certification	Agriculture Education
Resources	

Course Description:

Fundamental Animal Science will address the basic knowledge and skills necessary to care for and meet the needs of animals, along with soft skills necessary for careers in the Agriculture, Food and Natural Resources sector. Topics addressed in the course include: animal anatomy and physiology, animal health, safely working with animals, animal nutrition, reproductive systems, animal performance, animal industry issues, and employability. Utilizing appropriate equipment and technology should enhance classroom and laboratory content. Algebra, English, Biology and human relations skills will be reinforced in the course. Work-based learning strategies appropriate for this course are school-based enterprises and field trips. This class is reinforced through the FFA and Supervised Agricultural Experience (SAE) activities such as the Livestock Evaluation Career Development Event and related Proficiency Awards. Each student will be expected to maintain a SAE.

Program of Study Application:

Fundamental Animal Science is a first pathway course in the Agriculture, Food and Natural Resources Program of Study, Animal Systems pathway. Fundamental Animal Science is preceded by a Cluster course and is recommended to be taken prior to participation in Advanced Animal Science or Ag Biotechnology.

Course Standards

AN 1 Examine animal anatomy and physiology

Webb Level	*Sub-indicator*	*Integrated Content*
One Recall	AN 1.1 Recognize animals by species, gender or use.	
One Recall	AN 1.2 Identify the parts of an animal's anatomy.	

Notes

AN 2 Examine animal health

Webb Level	*Sub-indicator*	*Integrated Content*
Two Skill/Concept	AN 2.1 Evaluate a subject animal to determine the nature of its health.	Diseases
One Recall	AN 2.2 Understand proper usage and effects of animal health products.	Compare treatment options

Notes

AN 3 Describe practices for safely working with animals

Webb Level	*Sub-indicator*	*Integrated Content*
One Recall	AN 3.1 Judge an animal's behavior to safely work with it.	
Two Skill/Concept	AN 3.2 Examine animal housing, equipment and handling facilities for the safety of animals and handlers.	
Two Skill/Concept	AN 3.3 Select management practices to reduce the effects of animal production on the environment.	

Notes

AN 4 Distinguish elements of proper animal nutrition.

Webb Level	*Sub-indicator*	*Integrated Content*
Two Skill/Concept	AN 4.1 Compare an animal's differing nutritional needs throughout its life cycle.	
One Recall	AN 4.2 Prepare a feed ration to fulfill a given animal's nutrient requirements.	

Notes

AN 5 Study the reproductive system of animals.

Webb Level	*Sub-indicator*	*Integrated Content*
One Recall	AN 5.1 Examine male and female reproductive systems.	
One Recall	AN 5.2 Discuss reproductive cycles and breeding techniques.	
Two Skill/Concept	AN 5.3 Evaluate an animal to determine breeding soundness and readiness.	

Notes

AN 6 Identify factors that affect an animal's performance.

Webb Level	*Sub-indicator*	*Integrated Content*
Two Skill/Concept	AN 6.1 Predict genetic outcomes.	
Two Skill/Concept	AN 6.2 Determine optimum performance levels for a given animal species.	
Two Skill/Concept	AN 6.3 Assess an animal to determine if it has reached its optimum performance level.	

Notes

AN 7 Examine animal industry issues.

Webb Level	*Sub-indicator*	*Integrated Content*
Two Skill/Concept	AN 7.1 Compare and contrast consumer concerns related to animal food products.	
Two Skill/Concept	AN 7.2 Analyze consumer concern related to animal welfare.	

Notes

AN 8 Develop employability skills related to the Animal Systems Pathway.

Webb Level	*Sub-indicator*	*Integrated Content*
Two Skill/Concept	AN 8.1 Develop soft skills to enhance employability.	

Notes

Advanced Animal Science

Career Cluster	Agriculture, Food and Natural Resources
Course Code	18107
Prerequisite(s)	Recommended: Intro to AFNR, Fundamental Animal Science
Credit	0.5 of 1.0
Graduation Requirement	
Program of Study and Sequence	Fundamental Animal Science – **Advanced Animal Science** – Ag Biotechnology
Student Organization	National FFA Organization
Coordinating Work-Based Learning	Job shadowing, mentoring, internships, entrepreneurships, service learning, workplace tours, apprenticeship, school-based enterprises, Supervised Agricultural Experience (SAE)
Industry Certifications	OSHA 10 Hour Safety Certification (Agricultural or General Industry), National Career Readiness Certificate (NCRC)
Dual Credit or Dual Enrollment	
Teacher Certification	Agriculture Education
Resources	

Course Description:

Advanced Animal Science will address the advanced knowledge and skills necessary to care for and meet the needs of animals, along with soft skills necessary for careers in the Agriculture, Food and Natural Resources sector. Topics covered include: animal health care practices, nutrition management, reproductive practices, medical terminology, animal classification, surgical techniques, and employability skills. Advanced Animal Science has an increased focus on the veterinary portion of animal husbandry. Utilizing appropriate equipment and technology should enhance classroom and laboratory content. Algebra, English, Biology and human relations skills will be reinforced in the course. Work-based learning strategies appropriate for this course are school-based enterprises and field trips. This class is reinforced through the FFA and Supervised Agricultural Experience (SAE) activities such as the Livestock Evaluation Career Development Event and related Proficiency Awards. Each student will be expected to maintain a SAE.

Program of Study Application:

Advanced Animal Science is the second pathway course in the Agriculture, Food and Natural Resources Program of Study, Animal Systems pathway. Advanced Animal Science is preceded by Fundamental Animal Science and is recommended to be taken prior to participation in Ag Biotechnology.

Course Standards

ADAn 1 Select proper health care practices for animals.

Webb Level	*Sub-indicator*	*Integrated Content*
Four Extended Thinking	ADAn 1.1 Choose prevention and treatment programs for animal diseases, parasites and disorders.	
Two Skill/Concept	ADAn 1.2 Discuss how to provide biosecurity for animals, people, and facilities.	

Notes

ADAn 2 Develop proper nutrition management practices to optimize animal performance.

Webb Level	*Sub-indicator*	*Integrated Content*
Three Strategic Thinking	ADAn 2.1 Assess nutritional elements as they affect animal performances.	
Three Strategic Thinking	ADAn 2.2 Assemble feed rations to provide for animals' nutritional needs.	

Notes

ADAn 3 Select reproductive practices to optimize animal production.

Webb Level	*Sub-indicator*	*Integrated Content*
Four Extended Thinking	ADAn 3.1 Identify management practices in breeding that account for high quality animals.	

Notes

ADAn 4 Articulate medical terminology as it relates to animals.

Webb Level	*Sub-indicator*	*Integrated Content*
One Recall	ADAn 4.1 Recognize relevant medical terminology related to animals.	
Two Skill/Concept	ADAn 4.2 Apply medical terminology in the correct context.	

Notes

ADAn 5 Classify, evaluate and select animals based on anatomical and physiological characteristics (National AFNR AS.06).

Webb Level	*Sub-indicator*	*Integrated Content*
Two Skill/Concept	ADAn 5.1 Apply principles of anatomy and physiology to uses within various animal systems.	
One Recall	ADAn 5.2 Identify and explain the relationships among the various systems of the body.	

Notes

ADAn 6 Utilize principles of surgical techniques.

Webb Level	*Sub-indicator*	*Integrated Content*
One Recall	AdAn 6.1 Identify surgical tools and supplies.	
Four Extended Thinking	ADAn 6.2 Apply proper surgical techniques to medical situations.	

Notes

ADAn 7 Develop employability skills related to the Animal Systems Pathway.

Webb Level	*Sub-indicator*	*Integrated Content*
Two Skill/Concept	ADAn 7.1 Develop soft skills to enhance employability.	

Notes

Ag Biotechnology

Career Cluster	Agriculture, Food and Natural Resources
Course Code	18308
Prerequisite(s)	Recommended: Introduction to AFNR
Credit	0.5 or 1.0
Graduation Requirement	N
Program of Study and Sequence	Pathway course in Animal Systems, Food Product and Processing Systems, Plant Systems, or Natural Resources and Environmental Science Systems – **Ag Biotechnology** – Capstone Experience
Student Organization	National FFA Organization
Coordinating Work-Based Learning	Job shadowing, mentoring, internships, entrepreneurships, service learning, workplace tours, apprenticeship, school-based enterprises, Supervised Agricultural Experience (SAE)
Industry Certifications	OSHA 10 Hour Safety Certification (General Industry), National Career Readiness Certificate (NCRC)
Dual Credit or Dual Enrollment	
Teacher Certification	Agriculture Education
Resources	

Course Description:

Our lives are increasingly touched by technological advances in biology from discoveries in disease and pest control to reproductive capabilities in plants and animals as well as biological benefits in environmental sciences. Agricultural biotechnology will experience a large growth rate in the next five years particularly in the areas of crop and livestock genetic engineering. Biotechnology in Agriculture is designed to provide students with basic lab skills and skills in biotechnology applications in plant and animal sciences. Utilizing appropriate equipment and technology may enhance classroom and laboratory content; mathematics, English, biology, and human relations skills will be reinforced in the course. Work-based learning strategies appropriate for this course are school-based enterprises and field trips. Opportunities for application of clinical and leadership skills are provided by participation in FFA through activities, conferences and skills competition such as science-related Career Development Events and Proficiency awards. Each student will be expected to maintain a Supervised Agricultural Experience Program (SAE).

Program of Study Application

Ag Biotechnology is an upper level pathway course in the Animal Systems, Food Product and Processing Systems, Plant Systems, and Natural Resources and Environmental Science Systems pathways in the Agriculture, Food and Natural Resources Cluster. Ag Biotechnology would follow a cluster course in any of those pathways, and would precede a capstone experience.

Career Cluster: AFNR

Course: Ag Biotechnology

Course Standards

AB 1 Assess factors that have influenced the evolution of biotechnology in agriculture. [National AFNR BS.01.

Webb Level	*Sub-indicator*	*Integrated Content*
Three Strategic Thinking	AB 1.1 Investigate and explain the relationships among past, current and emerging applications of biotechnology in agriculture.	
Three Strategic Thinking	AB 1.2 Evaluate the scope and implications of regulatory agencies on applications of biotechnology in agriculture and protection of public interests.	
Four Extended Thinking	AB 1.3 Analyze the relationships and implications of bioethics, laws and public perceptions on applications of biotechnology in agriculture.	

Notes

AB 2 Illustrate the functions and importance of biotechnology at the cellular level.

Webb Level	*Sub-indicator*	*Integrated Content*
One Recall	AB 2.1 Recognize components of cells and their application to genetic improvement.	
One Recall	AB 2.2 Illustrate the role of cell structures in genetic theory.	

Notes

Career Cluster: AFNR

Course: Ag Biotechnology

AB 3 Safely apply appropriate skills to complete tasks in a biotechnology research and development environment.

Webb Level	*Sub-indicator*	*Integrated Content*
Two Skill/Concept	AB 3.1 Read, document, evaluate and secure accurate laboratory records of experimental protocols, observations and results.	
Three Strategic Thinking	AB 3.2 Implement standard operating procedures (SOP) for the biotechnology sector.	

Notes

AB 4 Analyze the application of biotechnology to solve problems in Agriculture, Food and Natural Resources (AFNR) systems. National AFNR BS.03

Webb Level	*Sub-indicator*	*Integrated Content*
Three Strategic Thinking	AB 4.1 Investigate biotechnology principles, techniques and processes to enhance plant systems.	
Three Strategic Thinking	AB 4.2 Investigate biotechnology principles, techniques and processes to enhance animal systems.	
Three Strategic Thinking	AB 4.3 Investigate biotechnology principles, techniques and processes to enhance food products and processing systems.	
Three Strategic Thinking	AB 4.4 Investigate biotechnology principles, techniques and processes to enhance natural resources and environmental service systems.	

Notes

Career Cluster: AFNR

Course: Ag Biotechnology

AB 5 Develop employability skills related to the Animal, Food Product and Processing, Plant, and Natural Resources and Environmental Science Systems.

Webb Level	*Sub-indicator*	*Integrated Content*
Two Skill/Concept	AB 5.1 Develop soft skills to enhance employability.	

Notes

Food Science

Career Cluster	Agriculture, Food and Natural Resources
Course Code	18305
Prerequisite(s)	Recommended: Introduction to AFNR
Credit	0.5 of 1.0
Graduation Requirement	No
Program of Study and Sequence	Cluster Course – **Food Science** – Ag Processing Technology (Food and Fiber)
Student Organization	National FFA Organization
Coordinating Work-Based Learning	Job shadowing, mentoring, internships, entrepreneurships, service learning, workplace tours, apprenticeship, school-based enterprises, Supervised Agricultural Experience (SAE)
Industry Certifications	OSHA 10 Hour Safety Certification (General Industry), National Career Readiness Certificate (NCRC)
Dual Credit or Dual Enrollment	
Teacher Certification	Agriculture Education
Resources	

Course Description:

The state of South Dakota is diverse in the agriculture products it produces and the value added food products available to the consumer. Food Science is a course designed to provide students with an overview of food science and its importance to producers and consumers. Classroom and laboratory content may be enhanced by utilizing appropriate equipment and technology. Mathematics, science, English and human relations skills will be reinforced in the course. Work-based learning strategies appropriate for this course are school-based enterprises, field trips and internships. Opportunities for application of clinical and leadership skills are provided by participation in FFA through activities, conferences and skills competitions such as the Food Science Career Development Event (CDE), Meat Evaluation CDE and Milk Quality and Products CDE. Each student will be expected to maintain a Supervised Agricultural Experience (SAE).

Program of Study Application:

Food Science is a first pathway course in the Agriculture, Food and Natural Resources cluster, Food Product and Processing Systems pathway. Food Science would follow a cluster course and would prepare a student to participate in Ag Processing Technology (Food and Fiber).

Course Standards

FS 1 Examine the makeup of the food industry.

Webb Level	*Sub-indicator*	*Integrated Content*
Three Strategic Thinking	FS 1.1 Investigate advancements in food science techniques.	
Two Skill/Concept	FS 1.2 Identify organizations and their impact on the food industry.	

Notes

FS 2 Apply safety and sanitation procedures for food production.

Webb Level	*Sub-indicator*	*Integrated Content*
One Recall	FS 2.1 Describe proper safety and sanitation practices when working with food products.	
Two Skill/Concept	FS 2.2 Apply safety and sanitation practices used in the food industry.	
One Recall	FS 2.3 Identify origins of food borne pathogens and effective prevention and control methods.	

Notes

FS 3 Apply principles of science to producing safe, wholesome and nutritious food products.

Webb Level	*Sub-indicator*	*Integrated Content*
Two Skill/Concept	FS 3.1 Apply fundamental chemistry to food science.	
Two Skill/Concept	FS 3.2 Differentiate the makeup of food products.	
Three Strategic Thinking	FS .3.3 Develop a food product that meets the standards of regulatory agencies.	

Notes

FS 4 Develop employability skills related to the Food Product and Processing Systems.

Webb Level	*Sub-indicator*	*Integrated Content*
Two Skill/Concept	FS 3.4 Develop soft skills to enhance employability.	

Notes

Agriculture Processing Technology

Career Cluster	Agriculture, Food and Natural Resources
Course Code	18302
Prerequisite(s)	Recommended: Introduction to AFNR
Credit	0.5 of 1.0
Graduation Requirement	
Program of Study and Sequence	Food Science – **Ag Processing Technology (Food and Fiber)** – Ag Biotechnology or capstone experience
Student Organization	National FFA Organization
Coordinating Work-Based Learning	Job shadowing, mentoring, internships, entrepreneurships, service learning, workplace tours, apprenticeship, school-based enterprises, Supervised Agricultural Experience (SAE)
Industry Certifications	OSHA 10 Hour Safety Certification (General Industry), National Career Readiness Certificate (NCRC)
Dual Credit or Dual Enrollment	
Teacher Certification	Agriculture Education
Resources	

Course Description:

Ag Processing Technology highlights the raw commodity and its journey to consumer-ready, value-added products. Utilizing appropriate equipment, technology, mathematics, science and English, may enhance classroom and laboratory content and human relations skills will be reinforced in the course. Work-based learning strategies appropriate for this course are school-based enterprises, field trips and internships. Opportunities for application of clinical and leadership skills are provided by participation in FFA through activities, conferences and skills competitions such as the Food Science Career Development Event (CDE), Meat Evaluation CDE and Milk Quality and Products CDE. Each student will be expected to maintain a Supervised Agricultural Experience (SAE).

Program of Study Application:

Ag Processing Technology (Food and Fiber) is a second pathway course in the Agriculture, Food and Natural Resources cluster, Food Product and Processing Systems pathway. Ag Processing Technology (Food and Fiber) would follow Food Science and would prepare a student to participate in Ag Biotechnology or a capstone experience.

Course Standards

AgP 1 Examine the makeup of the food processing industry.

Webb Level	*Sub-indicator*	*Integrated Content*
Three Strategic Thinking	AgP 1.1 Investigate the evolution of the food processing industry.	
Two Skill/Concept	AgP 1.2 Discuss how food safety is addressed in the food processing industry.	
One Recall	AgP 1.3 Explain how regulatory agencies in the food industry work to protect consumers.	

Notes

AgP 2 Demonstrate operational procedures used in the food industry.

Webb Level	*Sub-indicator*	*Integrated Content*
Two Skill/Concept	AgP 2.1 Translate regulatory procedures as they apply to food processing.	
Two Skill/Concept	AgP 2.2 Demonstrate worker safety procedures for food processing equipment.	

Notes

AgP 3 Process foods for storage, distribution and consumption.

Webb Level	*Sub-indicator*	*Integrated Content*
One Recall	AgP 3.1 Classify processed food products.	
Two Skill/Concept	AgP 3.2 Utilize industry harvesting, selection and inspection techniques.	
One Recall	AgP 3.3 Describe the steps involved with producing various food products.	
Four Extended Thinking	AgP 3.4 Process food safely.	

Notes

AgP 4 Develop employability skills related to the Food Product and Processing Systems.

Webb Level	*Sub-indicator*	*Integrated Content*
Two Skill/Concept	AgP 4.1 Develop soft skills to enhance employability.	

Notes

Fundamental Ag Structures Technology

Career Cluster	Agriculture, Food & Natural Resources
Course Code	18403
Prerequisite(s)	Recommended: Introduction to AFNR
Credit	.5
Graduation Requirement	NO
Program of Study and Sequence	Cluster Course – **Fundamental Ag Structures Technology** – Advanced Ag Structures Technology
Student Organization	National FFA Organization
Coordinating Work-Based Learning	Job shadowing, mentoring, internships, entrepreneurships, service learning, workplace tours, apprenticeship, school-based enterprises, Supervised Agricultural Experience (SAE)
Industry Certifications	OSHA 10 Hour Safety Certification (Construction Industry or General Industry), National Career Readiness Certificate (NCRC)
Dual Credit or Dual Enrollment	
Teacher Certification	Agriculture Education
Resources	

Course Description:

Fundamental Ag Structures Technology offers basic skills needed to be successful in the agricultural structures industry, such as the safe use of hand tools and power tools, drafting of structural plans, concrete and electrical fundamentals. The course will also incorporate soft skills necessary for careers in the Agriculture, Food and Natural Resources sector. South Dakota continues to face a shortage of certified electricians, plumbers and contractors, leaving these careers in high demand. Classroom and laboratory content may be enhanced by utilizing appropriate equipment and technology. Algebra, geometry, trigonometry, English and human relations skills will be reinforced in the course. Work-based learning strategies appropriate for this course are school-based enterprises and field trips. This class is reinforced through the FFA and Supervised Agricultural Experience (SAE) programs, the Ag Mechanics Career Development Event, and related Proficiency Experience or Internship Project. Each student will be expected to maintain a SAE.

Program of Study Application

Fundamental Ag Structures Technology is a first pathway course in the Agriculture, Food and Natural Resources Program of Study, Power Systems pathway. Fundamental Ag Structures Technology is preceded by a Cluster course and is recommended to be taken prior to participation in Advanced Ag Structures Technology.

Course Standards

AgS 1 Use safe practices associated with agriculture structures.

Webb Level	*Sub-indicator*	*Integrated Content*
Two Skill/Concept	AgS 1.1 Demonstrate safe use of tools and equipment while constructing agriculture structures.	

Notes

AgS 2 Develop plans for an agriculture structure project.

Webb Level	*Sub-indicator*	*Integrated Content*
Three Strategic Thinking	AgS 2.1 Use computer skills or drafting tools to develop sketches and plans for an ag structure.	

Notes

AgS 3 Examine various materials required for an agricultural structure.

Webb Level	*Sub-indicator*	*Integrated Content*
Two Skill/Concept	AgS 3.1 Investigate the differences in materials needed to assemble an ag structure.	
Three Strategic Thinking	AgS 3.2 Demonstrate knowledge of structural materials by developing a supply list, along with cost estimates for a given project.	

Notes

AgS 4 Construct an agriculture structure.

Webb Level	*Sub-indicator*	*Integrated Content*
Four Extended Thinking	AgS 4.1 Assemble components of a structure.	
Four Extended Thinking	AgS 4.2 Create a complete agriculture structure by combining individually constructed components.	

Notes

AgS 5 Demonstrate electrical principles.

Webb Level	*Sub-indicator*	*Integrated Content*
Two Skill/Concept	AgS 5.1 Explain basic electrical terms and principles.	
Three Strategic Thinking	AgS 5.2 Use applicable instruments to demonstrate knowledge of basic electricity.	
Three Strategic Thinking	AgS 5.3 Demonstrate wiring and electrical applications.	

Notes

AgS 6 Analyze properties and conditions of building site prior to construction.

Webb Level	*Sub-indicator*	*Integrated Content*
Two Skill/Concept	AgS 6.1 Explain legal land descriptions and plat maps.	
Three Strategic Thinking	AgS 6.2 Examine geographical characteristics of building site.	Water tables, utilities, flood hazards
Three Strategic Thinking	AgS 6.3 Operate surveying equipment.	New or old technology

Notes

AgS 7 Analyze various concrete and masonry concepts.

Webb Level	*Sub-indicator*	*Integrated Content*
One Recall	AgS 7.1 - Identify tools and materials used in concrete and masonry projects.	

Notes

AgS 8 Explore career opportunities in agricultural structures and mechanics.

Webb Level	*Sub-indicator*	*Integrated Content*
Two Skill/Concept	AgS 8.1 Investigate career opportunities that pertain to agricultural structures.	
Two Skill/Concept	AgS 8.2 Develop soft skills to enhance employability.	

Notes

Advanced Ag Structures Technology

Career Cluster	AFNR
Course Code	18406
Prerequisite(s)	Fundamental Ag Structures Technology, Recommended: Introduction to AFNR
Credit	.5
Graduation Requirement	No
Program of Study and Sequence	Fundamental Ag Structures Technology – **Advanced Ag Structures Technology** – Capstone Experience
Student Organization	National FFA Organization
Coordinating Work-Based Learning	Job shadowing, mentoring, internships, entrepreneurships, service learning, workplace tours, apprenticeship, school-based enterprises, Supervised Agricultural Experience (SAE)
Industry Certifications	OSHA 10 Hour Safety Certification (Agricultural, Construction Industry, or General Industry), National Career Readiness Certificate (NCRC)
Dual Credit or Dual Enrollment	
Teacher Certification	Agriculture Education
Resources	

Course Description:

Advanced Ag Structures Technology is offered to meet more advanced needs in the agricultural structures industry, along with soft skills necessary for careers in the Agriculture, Food and Natural Resources sector. South Dakota continues to face a shortage of certified electricians, plumbers, contractors and mechanics, leaving these careers in high demand. Classroom and laboratory content may be enhanced by utilizing appropriate equipment and technology. Algebra, geometry, trigonometry, English and human relations skills will be reinforced in the course. This class is reinforced through the FFA and Supervised Agricultural Experience (SAE) programs, the Ag Mechanics Career Development Event, and related Proficiency Experience or Internship Project. Each student will be expected to maintain an SAE.

Program of Study Application

Advanced Ag Structures Technology is the second pathway course in the Agriculture, Food and Natural Resources Program of Study, Power Systems pathway. Fundamental Ag Structures Technology is a prerequisite for Advanced Ag Structures Technology. Advanced Ag Structures Technology would be followed by a capstone experience.

Course Standards

AdS 1 Use safe practices when planning, maintaining, and constructing agricultural structures.

Webb Level	*Sub-indicator*	*Integrated Content*
Two Skill/Concept	AdS 1.1 Demonstrate safe use of tools and equipment while constructing agriculture structures.	
Three Strategic Thinking	AdS 1.2 Demonstrate understanding of tool repair and maintenance.	

Notes

AdS 2 Service and repair mechanical equipment and structures.

Webb Level	*Sub-indicator*	*Integrated Content*
Three Strategic Thinking	AdS 2. 1 Analyze schematics to service various systems in an ag structure.	Electrical, HVAC, plumbing

Notes

AdS 3 Utilize a structural plan that meets specifications and building codes.

Webb Level	*Sub-indicator*	*Integrated Content*
Three Strategic Thinking	AdS 3.1 Examine blueprints and local codes that identify required components of an ag structure.	
Three Strategic Thinking	AdS 3.2 Design a construction plan for an agricultural structure.	Blueprints, list of materials, codes, etc.

Notes

AdS 4 Use plans to guide construction of agricultural structures.

Webb Level	*Sub-indicator*	*Integrated Content*
Four Extended Thinking	AdS 4.1 Use architectural and mechanical plans to construct agricultural buildings or facilities.	

Notes

AdS 5 Apply a variety of concrete and masonry concepts to various projects.

Webb Level	*Sub-indicator*	*Integrated Content*
Three Strategic Thinking	AdS 5.2 Demonstrate concrete and masonry procedures.	

Notes

AdS 6 – Investigate a variety of plumbing tools and products.

Webb Level	*Sub-indicator*	*Integrated Content*
One Recall	AdS 6.1 Identify tools and materials used for plumbing.	
Three Strategic Thinking	AdS 6.2 Demonstrate various plumbing techniques.	

Notes

AdS 7 Develop employability skills related to the Power, Structural, and Technical Systems Pathway.

Webb Level	*Sub-indicator*	*Integrated Content*
Two Skill/Concept	AdS 7.1 Develop soft skills to enhance employability.	

Notes

Fundamental Ag Mechanical Technologies

Career Cluster	AFNR
Course Code	18401
Prerequisite(s)	Recommended: Introduction to AFNR
Credit	.5 or 1.0
Graduation Requirement	No
Program of Study and Sequence	Cluster Course – **Fundamental Ag Mechanical Technologies** – Ag Systems Technology or Ag Metal Fabrication
Student Organization	National FFA Organization
Coordinating Work-Based Learning	Job shadowing, mentoring, internships, entrepreneurships, service learning, workplace tours, apprenticeship, school-based enterprises, Supervised Agricultural Experience (SAE)
Industry Certifications	OSHA 10 Hour Safety Certification (Construction Industry or General Industry), National Career Readiness Certificate (NCRC)
Dual Credit or Dual Enrollment	
Teacher Certification	Agriculture Education
Resources	

Course Description:

Fundamental Ag Mechanical Technologies is offered to help students build basic knowledge and skills in the area of agricultural mechanics, along with soft skills necessary for careers in the Agriculture, Food and Natural Resources sector. Topics covered in this course include: electricity, engines and ag technology. More substantial knowledge on the individual topics comes in advanced courses such as Ag Systems Technology, Ag Metal Fabrication, and Fundamental Ag Structures. Classroom and laboratory content may be enhanced by utilizing appropriate equipment and technology. Algebra, geometry, English and human relation skills will be reinforced in the course. Work-based learning strategies appropriate for this course are school-based enterprises and field trips. This class is reinforced through the FFA and Supervised Agricultural Experience (SAE) programs, the Ag Mechanics Career Development Event, and related Proficiency Experience or Internship Project. Each student will be expected to maintain a SAE.

Program of Study Application

Fundamental Ag Mechanical Technologies is a first pathway course in the Agriculture, Food and Natural Resources Program of Study, Power Systems pathway. Fundamental Ag Mechanical Technologies is preceded by a Cluster course and is recommended to be taken prior to participation in Ag Systems Technology or Ag Metal Fabrication.

Course Standards

FAM 1 – Apply safety practices in mechanical applications.

Webb Level	*Sub-indicator*	*Integrated Content*
Two Skill/Concept	FAM 1.1 – Explain the safe operation and servicing of machinery and equipment.	Be sure to include welding and electrical safety
Three Strategic Thinking	FAM 1.2 – Demonstrate safe operation of construction/fabrication tools.	

Notes

FAM 2 – Identify maintenance procedures & schedules for mechanical equipment, power and agricultural technology.

Webb Level	*Sub-indicator*	*Integrated Content*
Two Skill/Concept	FAM 2.1 Identify parts and explain functions of various mechanical systems.	Internal combustion engines Hydraulic systems Pneumatic systems
Two Skill/Concept	FAM 2.2 – Investigate common maintenance schedules and practices for equipment.	Manuals, online searching for maintenance schedules
Three Strategic Thinking	FAM 2.3 – Troubleshoot problems in mechanical systems.	

Notes

FAM 3 – Demonstrate basic skills in project planning and metal fabrication.

Webb Level	*Sub-indicator*	*Integrated Content*
Three Strategic Thinking	FAM 3.1 – Create sketches of metal projects.	
Two Skill/Concept	FAM 3.2 – Demonstrate basic welding principles and techniques.	Metal Inert Gas (MIG), Shielded Metal Arc Welding (SMAW), Oxy-fuel cutting, Tungsten Inert Gas (TIG)
Three Strategic Thinking	FAM 3.3 – Employ metal fabrication principles to create a metal project.	

Notes

FAM 4 – Apply electrical principles in agricultural applications.

Webb Level	*Sub-indicator*	*Integrated Content*
One Recall	FAM 4.1 – Recognize the components and functions of electrical systems.	
Three Strategic Thinking	FAM 4.2 – Demonstrate fundamental principles of electricity.	

Notes

FAM 5 – Investigate emerging agricultural technologies.

Webb Level	*Sub-indicator*	*Integrated Content*
Two Skill/Concept	FAM 5.1– Investigate new and/or existing technology in agriculture.	Global Positioning System (GPS), Geographic Information System (GIS), drones, robotics, etc.

Notes

FAM 6 – Develop employability skills related to the Power, Structural, and Technical Systems Pathway.

Webb Level	*Sub-indicator*	*Integrated Content*
Two Skill/Concept	FAM 6.1– Develop soft skills to enhance employability.	

Notes

Ag Systems Technology

Career Cluster	AFNR
Course Code	18402
Prerequisite(s)	Fundamental Ag Mechanical Technologies, Recommended: Introduction to AFNR
Credit	.5 or 1.0
Graduation Requirement	No
Program of Study and Sequence	Fundamental Ag Mechanical Technologies – **Ag Systems Technology** – Capstone Experience
Student Organization	National FFA Organization
Coordinating Work-Based Learning	Job shadowing, mentoring, internships, entrepreneurships, service learning, workplace tours, apprenticeship, school-based enterprises, Supervised Agricultural Experience (SAE)
Industry Certifications	OSHA 10 Hour Safety Certification (Agricultural, Construction Industry, or General Industry), National Career Readiness Certificate (NCRC)
Dual Credit or Dual Enrollment	
Teacher Certification	Agriculture Education
Resources	

Course Description:

Technically trained employees are needed in many aspects of the agriculture power industry. This course addresses the technical and industrial skills and techniques related to Power, Structural, & Technical Systems within South Dakota, as well as address soft skills needed for careers in this area. Technology in agriculture is ever-changing and this course will address emerging technologies in our industry. Classroom and laboratory content may be enhanced by utilizing appropriate equipment and technology. Mathematics, science, English and human relations skills will be reinforced throughout the course. Work-based learning strategies appropriate for this course are school-based enterprises and field trips. Opportunities for application of clinical and leadership skills are provided by participation in FFA activities, conference and skills competition such as the Ag Mechanics Career Development Event or related proficiency award areas. Each student will be expected to maintain a Supervised Agricultural Experience (SAE) program.

Program of Study Application

Ag Systems Technology is a second pathway course in the Agriculture, Food and Natural Resources Program of Study, Power Systems pathway. Ag Systems Technology is preceded by Fundamental Ag Mechanical Technologies and would be followed by a capstone experience.

Course Standards

AST 1 Apply engineering principles to mechanical equipment, power utilization and technology.

Webb Level	*Sub-indicator*	*Integrated Content*
Two Skill/Concept	AST 1.1 Compare power generation from various energy sources.	
Two Skill/Concept	AST 1.2 Investigate various properties of lubricants needed in ag mechanics.	

Notes

AST 2 Apply principles of operation and maintenance to mechanical equipment, power utilization, and technology.

Webb Level	*Sub-indicator*	*Integrated Content*
Two Skill/Concept	AST 2.1 Explain the importance of scheduled service routines to maintain machinery and equipment.	
Two Skill/Concept	AST 2.2 Demonstrate suggested inspections on machinery and/or equipment	Investigate regulations of operating machinery and equipment on public roads.

Notes

AST 3 Examine principles of service and repair to mechanical and electrical equipment, power utilizations and technology.

Webb Level	*Sub-indicator*	*Integrated Content*
Three Strategic Thinking	AST 3.1 Evaluate internal combustion engines to assess needed service and repair.	
Three Strategic Thinking	AST 3.2 Investigate service and repair specifications for operating systems.	(e.g. hydraulic systems, electrical systems, heating and cooling systems, steering, suspension, etc.)
Four Extended Thinking	AST 3.3 Diagnose problems associated with operating systems.	(e.g. hydraulic systems, electrical systems, heating and cooling systems, steering, suspension, etc.)
Two Skill/Concept	AST 3.4 Explore electric motor types, operation and maintenance.	

Notes

AST 4 Analyze emerging agriculture technologies.

Webb Level	*Sub-indicator*	*Integrated Content*
Two Skill/Concept	AST 4.1 Analyze how emerging agriculture technologies have affected AFNR industries.	(e.g. Global Positioning System (GPS), Geographic Information System (GIS), robotics, drones, etc.)

Notes

AST 5 Develop employability skills related to the Power, Structural, and Technical Systems Pathway.

Webb Level	*Sub-indicator*	*Integrated Content*
Two Skill/Concept	AST 5.1 Develop soft skills to enhance employability.	

Notes

Ag Metal Fabrication

Career Cluster	AFNR
Course Code	18404
Prerequisite(s)	Fundamental Ag Mechanical Technologies, Recommended: Introduction to AFNR
Credit	.5
Graduation Requirement	No
Program of Study and Sequence	Fundamental Ag Mechanical Technologies – **Ag Metal Fabrication** – Capstone Experience
Student Organization	National FFA Organization
Coordinating Work-Based Learning	Job shadowing, mentoring, internships, entrepreneurships, service learning, workplace tours, apprenticeship, school-based enterprises, Supervised Agricultural Experience (SAE)
Industry Certifications	OSHA 10 Hour Safety Certification (Construction Industry, or General Industry), National Career Readiness Certificate (NCRC), Certified Welder (AWS)
Dual Credit or Dual Enrollment	
Teacher Certification	Agriculture Education
Resources	

Course Description:

The Ag Metal Fabrication Technology course provides students with advanced metal fabrication skills, which include Shielded Metal Arc Welding (SMAW), Metal Inert Gas (MIG) welding/Gas Metal Arc Welding (GMAW), oxyacetylene fuel welding, brazing and cutting, Gas Tungsten Arc Welding (GTAW)/Tungsten Inert Welding (TIG), and plasma cutting. This course will also incorporate soft skills necessary for careers in the Power, Structural, and Technical Systems career pathway. Classroom and laboratory content will be enhanced by utilizing appropriate equipment and technology. Geometry, physical science, physics, English and human relations skills will be reinforced throughout this course. Work-based learning opportunities appropriate for this course are school-based enterprises and field trips. Opportunities for application of clinical and leadership skills are provided by participation in FFA activities, conferences, and Career Development Events. Each student will be expected to maintain a Supervised Agricultural Experience (SAE).

Program of Study Application

Ag Metal Fabrication is a second pathway course in the Agriculture, Food and Natural Resources Program of Study, Power Systems pathway. Ag Metal Fabrication is preceded by Fundamental Ag Mechanical Technologies and would be followed by a capstone experience.

Course Standards

AMF 1 Demonstrate the basics of metal fabrication.

Webb Level	*Sub-indicator*	*Integrated Content*
Two Skill/Concept	AMF 1.1 Demonstrate knowledge of metal fabrication techniques and related technologies.	
Two Skill/Concept	AMF 1.2 Prepare various metals for welding.	
Three Strategic Thinking	AMF 1.3 Create plans for metal project construction.	

Notes

AMF 2 Demonstrate the principles of Shielded Metal Arc Welding (SMAW) and the correct operation of SMAW equipment.

Webb Level	*Sub-indicator*	*Integrated Content*
Two Skill/Concept	AMF 2.1 Perform Shielded Metal Arc Welding (SMAW) techniques.	

Notes

AMF 3 Demonstrate the principles of Metal Inert Gas (MIG) welding, also known as Gas Metal Arc Welding (GMAW), and the correct operation of MIG equipment.

Webb Level	*Sub-indicator*	*Integrated Content*
Two Skill/Concept	AMF 3.1 Perform metal inert gas (MIG) welding techniques.	

Notes

AMF 4 Understand the correct operation of oxyacetylene equipment.

Webb Level	*Sub-indicator*	*Integrated Content*
Two Skill/Concept	AMF 4.1 Explore oxyacetylene welding, cutting, and brazing.	

Notes

AMF 5 Explore advanced welding processes.

Webb Level	*Sub-indicator*	*Integrated Content*
Two Skill/Concept	AMF 5.1 Investigate and explain principles of advanced welding processes (e.g. Tungsten Inert Gas (TIG) welding, plasma cutting)	

Notes

AMF 6 Develop employability skills related to the Power, Structural, and Technical Systems Pathway.

Webb Level	*Sub-indicator*	*Integrated Content*
Two Skill/Concept	FAM 6.1– Develop soft skills to enhance employability.	
Two Skill/Concept	FAM 6.2 Investigate careers related to metal fabrication.	

Notes

Fundamental Natural Resources

Career Cluster	Agriculture, Food and Natural Resources
Course Code	18504
Prerequisite(s)	Recommended: Introduction to AFNR
Credit	0.5 or 1.0
Graduation Requirement	No
Program of Study and Sequence	Cluster course – **Fundamental Natural Resources** – Advanced Natural Resources or Wildlife and Fisheries
Student Organization	National FFA Organization
Coordinating Work-Based Learning	Job shadowing, mentoring, internships, entrepreneurships, service learning, workplace tours, apprenticeship, school-based enterprises, Supervised Agricultural Experience (SAE)
Industry Certifications	OSHA 10 Hour Safety Certification (General Industry), National Career Readiness Certificate (NCRC)
Dual Credit or Dual Enrollment	
Teacher Certification	Agriculture Education
Resources	

Course Description:

People depend on natural resources. Regions, cultures, nations, and societies are shaped by how people use land, water, plants, and wildlife. South Dakota's natural resources – minerals, forests, ranges, wetlands, lakes, rivers, soils, along with all connected domestic and native plant and animal communities – play an important role in its economic health, including mining, agriculture, outdoor recreation, and tourism. The large and small ecosystems that make up the environment are complex. Fundamental Natural Resources provides students with an overview of the planet's natural resource systems, along with examining those resources unique to South Dakota. Students will explore and develop a basic understanding of how the systems relate to one another other. Students will consider the roles people play in, and the occupations related to, managing, using, protecting, and conserving natural resources. Classroom and laboratory content should be enhanced by utilizing up to date equipment and technology, such as Geographic Information System (GIS) software. Biology, statistics, algebra, English, and human relations skills will be reinforced throughout the course. Opportunities for application of clinical and leadership skills are provided by participation in FFA activities, conferences and skills competition such as sales related career development events and proficiency awards. Each student will be expected to maintain a Supervised Agricultural Experience (SAE) Program/Internship.

Program of Study Application

Fundamental Natural Resources is a first pathway course in the Agriculture, Food and Natural Resources cluster, Natural Resources and Environmental Science Systems pathway. Fundamental Natural Resources would follow a cluster course and would prepare a student to participate in either Advanced Natural Resources or Wildlife and Fisheries.

Course Standards

FNR 1: Examine the importance of resource and human interrelations to conduct management activities in natural habitats.

Webb Level	*Sub-indicator*	*Integrated Content*
One Recall	FNR 1.1 Explain resource management components to establish or enhance relationships in natural resource systems.	
Level 3 Strategic Thinking	FNR 1.2 Apply Geographic Information Systems (GIS) skills to natural resource activities.	
Two Skill/Concept	FNR 1.3 Examine planning data to determine natural resource status.	
One Recall	FNR 1.4 Discuss weather and other criteria to recognize dangers related to work in an outdoor environment.	

Notes

FNR 2: Interpret scientific principles of natural resource management activities.

Webb Level	*Sub-indicator*	*Integrated Content*
One Recall	FNR 2.1 Identify and classify plant- and animal-based natural resources.	
Two Skill/Concept	FNR 2.2 Identify natural cycles and related phenomena to describe ecologic concepts and principles.	
One Recall	FNR 2.3 Describe soil compositions and properties.	
One Recall	FNR 2.4 Examine wetland, watershed and groundwater properties, classifications and functions.	
Two Skill/Concept	FNR 2.5 Discuss forestry management techniques.	

Notes

FNR 3: Describe production practices and processing procedures for natural resources

Webb Level	*Sub-indicator*	*Integrated Content*
One Recall	FNR 3.1 Describe how natural resource products are produced, harvested, processed and used.	

Notes

FNR 4: Explain responsible practices to protect natural resources

Webb Level	*Sub-indicator*	*Integrated Content*
One Recall	FNR 4.1 Describe techniques and equipment needed to manage and conserve natural resources.	
Two Skill/Concept	FNR 4.2 Discuss animal and plant disease symptoms and prevention.	
One Recall	FNR 4.3 Recognize insect types and available controls to prevent insect infestation.	

Notes

Wildlife and Fisheries

Career Cluster	Agriculture, Food and Natural Resources
Course Code	18501
Prerequisite(s)	None
Credit	0.5
Graduation Requirement	No
Program of Study and Sequence	Cluster course – Fundamental Natural Resources – **Wildlife and Fisheries** – Capstone experience
Student Organization	National FFA Organization
Coordinating Work-Based Learning	Job shadowing, mentoring, internships, entrepreneurships, service learning, workplace tours, apprenticeship, school-based enterprises, Supervised Agricultural Experience (SAE)
Industry Certifications	OSHA 10 Hour Safety Certification (General Industry), National Career Readiness Certificate (NCRC)
Dual Credit or Dual Enrollment	
Teacher Certification	Agriculture Education
Resources	

Course Description:

Management of South Dakota's wildlife and fisheries is critical to our future economic stability. Skills gained in this area will be beneficial to students seeking careers in the many facets of wildlife and fisheries. The Wildlife and Fisheries course addresses the biological and environmental issues related to wildlife and fisheries management within our state. Classroom and laboratory content may be enhanced by utilizing appropriate equipment and technology. Biology, English and human relations skills will be reinforced throughout the course. Work-based learning strategies appropriate for this course are school-based enterprises and field trips. Opportunities for application of clinical and leadership skills are provided by participation in FFA activities, conferences and skills competitions such as the Natural Resources Career Development Event or related proficiency award areas. All students are expected to maintain a Supervised Agricultural Experience program.

Program of Study Application

Wildlife and Fisheries is a second pathway course in the Agriculture, Food and Natural Resources cluster, Natural Resources and Environmental Science Systems pathway. Wildlife and Fisheries would follow Fundamental Natural Resources and would prepare a student to participate in a capstone experience.

Career Cluster: Agriculture, Food & Natural Resources

Course: Wildlife and Fisheries

Course Standards

WF 1 Demonstrate the importance of fish and wildlife management, including their respective habitats. (National AFNR NRS.02)

Webb Level	*Sub-indicator*	*Integrated Content*
Two Skill/Concept	WF 1.1 Apply knowledge of natural resource components to the management of wildlife and fish.	
One Recall	WF 1.2 Identify fish and wildlife species.	
Two Skill/Concept	WF 1.3 Identify healthy habitat for wildlife and fish.	

Notes

WF 2 Identify economic and social issues related to fish and wildlife (National AFNR NRS.03)

Webb Level	***Sub-indicator***	*Integrated Content*
Two Skill/Concept	WF 2.1 Discuss hunting/harvesting fish and wildlife species as a management technique.	
Two Skill/Concept	WF 2.2 Demonstrate processing techniques to use game and fish as food sources.	
Two Skill/Concept	WF 2.3 Distinguish safety practices related to hunting and fishing activities.	

Notes

WF 3 Compare life patterns of fish and wildlife.

Webb Level	*Sub-indicator*	*Integrated Content*
Three Strategic Thinking	WF 3.1 Differentiate fish and wildlife function and form in their daily lives.	
One Recall	WF 3.2 Identify seasonal rituals of fish and wildlife species.	
Four Extended Thinking	WF 3.3 Diagnose wildlife and fish diseases.	

Notes

WF 4 Investigate careers in wildlife and fisheries conservation.

Webb Level	*Sub-indicator*	*Integrated Content*
Two Skill/Concept	WF 4.1 Locate, identify, research and interpret career information.	
Two Skill/Concept	WF 4.2 Compare and contrast characteristics of various careers	

Notes

Advanced Natural Resources

Career Cluster	Agriculture, Food and Natural Resources
Course Code	
Prerequisite(s)	Fundamental Natural Resources, Recommended: Introduction to AFNR
Credit	0.5 or 1.0
Graduation Requirement	
Program of Study and Sequence	Fundamental Natural Resources – **Advanced Natural Resources** – Capstone experience
Student Organization	National FFA Organization
Coordinating Work-Based Learning	Job shadowing, mentoring, internships, entrepreneurships, service learning, workplace tours, apprenticeship, school-based enterprises, Supervised Agricultural Experience (SAE)
Industry Certifications	OSHA 10 Hour Safety Certification (General Industry), National Career Readiness Certificate (NCRC)
Dual Credit or Dual Enrollment	
Teacher Certification	Agriculture Education
Resources	

Course Description:

Advanced Natural Resources is designed to build upon the basic concepts learned in the Fundamental Natural Resources course. Advanced Natural Resources gives the student a deeper understanding of the decision-making processes that are involved in environmental and natural resource management and conservation, globally, regionally and locally. Students will specifically examine issues related to natural resource use in South Dakota. Topics will include management strategies such as assessing rangeland condition, examining forest site indices, looking at the health of fisheries and wildlife and applying ecological concepts and principles to living organisms in natural resource systems, as related to sustained yield concepts. Students will be expected to understand the importance of soils and their relationship to all ecosystems. Students will be trained to assess air and water quality standards and parameters. Energy and mineral extraction industries will be examined along with looking at determining impacts on the soil, air, and water resources. Classroom and laboratory content may be enhanced by utilizing up-to-date equipment and technology, such as Geographic Information System software to map and inventory resources in real time. Biology, statistics, algebra, English, and human relation skills will be reinforced throughout the course. Opportunities for application of clinical and leadership skills are provided by participation in FFA activities, conferences and skills competition such as sales related career development events and proficiency awards. Each student will be expected to maintain a Supervised Agricultural Experience Program/Internship.

Program of Study Application

Advanced Natural Resources is a second pathway course in the Agriculture, Food and Natural Resources cluster, Natural Resources and Environmental Science Systems pathway. Advanced Natural Resources would follow Fundamental Natural Resources and would prepare a student to participate in a capstone experience.

Course Standards

ANR 1 Explore soil composition and soil management.

Webb Level	*Sub-indicator*	*Integrated Content*
Two Skill/Concept	ANR 1.1 Demonstrate techniques used to classify soils.	
Two Skill/Concept	ANR 1.2 Explain the importance of soil conservation.	
Four Extended Thinking	ANR 1.3 Analyze soils for agricultural and homesite uses.	
Four Extended Thinking	ANR 1.4 Analyze existing soil surveys to develop effective management plans.	

Notes

ANR 2 Apply ecological concepts and principles to rangeland conservation.

Webb Level	***Sub-indicator***	*Integrated Content*
Two Skill/Concept	ANR 2.1 Summarize the interrelationships of rangeland management, the environment, wildlife management, and the livestock industry.	
One Recall	ANR 2.2 Discuss practices used to improve rangeland quality.	
Four Extended Thinking	ANR 2.3 Analyze the carrying capacity in various rangelands for both wildlife species and domestic livestock.	
One Recall	ANR 2.4 Identify plants important to quality rangeland and determine rangeland condition.	

Notes

ANR 3: Understand forest management practices.

Webb Level	*Sub-indicator*	*Integrated Content*
One Recall	ANR 3.1 Identify trees and classify to species.	
Four Extended Thinking	ANR 3.2 Discuss forestry management techniques.	

Notes

ANR 4: Apply ecological concepts and principles to fisheries and wildlife in natural resources.

Webb Level	*Sub-indicator*	*Integrated Content*
Two Skill/Concept	ANR 4.1 Identify similarities and differences among wildlife and fish species.	
Three Strategic Thinking	ANR 4.2 Investigate wildlife management and habitat.	
Three Strategic Thinking	ANR 4.3 Differentiate among a variety of management practices used to manage wildlife populations.	
Four Extended Thinking	ANR 4.4 Enhance fish/wildlife habitat.	

Notes

ANR 5: Understand air and water use, examine management practices, and develop conservation strategies.

Webb Level	*Sub-indicator*	*Integrated Content*
Three Strategic Thinking	ANR 5.1 Explain the government's role in regulating air and water quality.	
One Recall	ANR 5.2 Define appropriate water conservation measures.	
Four Extended Thinking	ANR 5.3 Analyze the way in which water and air management affect the environment and human needs.	
Three Strategic Thinking	ANR 5.4 Measure and assess water and air quality parameters using federal, tribal, state and/or local standards.	

Notes

ANR 6: Develop plans to ensure sustainable production and processing of natural resources. (National NRS.03)

Webb Level	*Sub-indicator*	*Integrated Content*
Three Strategic Thinking	ANR 6.1 Explain methods used to sustainably produce, harvest, process and use natural resource products (e.g., forest products, wildlife, minerals, fossil fuels, shale oil, alternative energy, recreation, aquatic species, etc.)	
Two Skill/Concept	ANR 6.2 Compare the various production methods of alternative energy sources, both renewable and non-renewable, and their relations to economic, environmental and social sustainability.	
Four Extended Thinking	ANR 6.3 Evaluate methods used to extract and process minerals for economic, environmental, and social sustainability.	

Notes

Agribusiness Sales and Marketing

Career Cluster	Agriculture, Food and Natural Resources
Course Code	18201
Prerequisite(s)	Recommended: Introduction to AFNR
Credit	0.5 or 1.0
Graduation Requirement	No
Program of Study and Sequence	Cluster course – **Agribusiness Sales and Marketing** – Agribusiness Management
Student Organization	National FFA Organization
Coordinating Work-Based Learning	Job shadowing, mentoring, internships, entrepreneurships, service learning, workplace tours, apprenticeship, school-based enterprises, Supervised Agricultural Experience (SAE)
Industry Certifications	OSHA 10 Hour Safety Certification (General Industry), National Career Readiness Certificate (NCRC), Registered Parliamentarian
Dual Credit or Dual Enrollment	
Teacher Certification	Agriculture, Food and Natural Resources
Resources	

Course Description:

Agriculture businesses sell and market their products globally, regionally and locally, leading to many related positions at these businesses. Skills related to selling and marketing products greatly enhance the success of an employee in an agribusiness operation. Agribusiness Sales and Marketing is designed to provide students with skills that focus on job preparatory skills as well as employee tasks necessary in agricultural sales and marketing occupations and the many career opportunities in the Agribusiness Systems Career Pathway. Classroom and laboratory content may be enhanced by utilizing appropriate equipment and technology. Mathematics, English and human relations skills will be reinforced in the course. Work-based learning strategies appropriate for this course are school-based enterprises and field trips. Opportunities for application of clinical and leadership skills are provided by participation in FFA activities, conferences and skills competition such as sales related career development events and proficiency awards. Each student will be expected to maintain a Supervised Agricultural Experience Program/Internship.

Program of Study Application

Agribusiness Sales and Marketing is a first pathway course in the Agriculture, Food and Natural Resources Cluster, Agribusiness Systems Pathway. Agribusiness Sales and Marketing would be preceded by a cluster course and followed by Agribusiness Management.

Course Standards

ASM 1: Demonstrate the skills necessary to obtain and keep gainful employment in agribusiness occupations.

Webb Level	*Sub-indicator*	*Integrated Content*
Two Skill/Concept	ASM 1.1 Use written and oral skills to seek and obtain an agricultural job.	
Two Skill/Concept	ASM 1.2 Use marketable skills such as reliability and communications to improve self and to develop steps for systematic problem solving.	

Notes

ASM 2: Evaluate sales and marketing principles used to accomplish marketing objectives.

Webb Level	*Sub-indicator*	*Integrated Content*
Four Extended Thinking	ASM 2.1 Write a marketing plan for a product based on marketing objectives.	
Three Strategic Thinking	ASM 2.2 Merchandise products and services to meet the needs of a customer.	

Notes

ASM 3: Use technology and documents to manage agribusiness inventory.

Webb Level	*Sub-indicator*	*Integrated Content*
Two Skill/Concept	ASM 3.1 Apply reading comprehension, writing and math skills in inventory management.	
Four Extended Thinking	ASM 3.2 Analyze inventory data to determine acceptable business inventory stocking levels to manage business efficiency.	

Notes

ASM 4: Evaluate opportunities for marketing of agricultural products throughout the world.

Webb Level	*Sub-indicator*	*Integrated Content*
Two Skill/Concept	ASM 4.1 Locate areas of agricultural importance and determine the competitive advantage for production of agricultural products.	
Three Strategic Thinking	ASM 4.2 Develop an awareness of food production and global needs to determine how those needs can be met.	
Three Strategic Thinking	ASM 4.3 Investigate the process in developing international trading partners.	

Notes

ASM 5: Use sales and marketing principles to accomplish AFNR business objectives (Nat #5)

Webb Level	*Sub-indicator*	*Integrated Content*
Three Strategic Thinking	ASM 5.1 Analyze the roles of markets, trade, competition and price in relation to an AFNR business sales and marketing plan.	
Four Extended Thinking	ASM 5.2 Assess and apply sales principles and skills to accomplish AFNR business objectives.	
Three Strategic Thinking	ASM 5.3 Assess marketing principles and develop marketing plans to accomplish AFNR business objectives.	

Notes

Agribusiness Management

Career Cluster	Agriculture, Food and Natural Resources
Course Code	18202
Prerequisite(s)	Recommended: Introduction to AFNR
Credit	0.5 or 1.0
Graduation Requirement	No
Program of Study and Sequence	Agribusiness Sales and Marketing – **Agribusiness Management** – Capstone experience
Student Organization	National FFA Organization
Coordinating Work-Based Learning	Job shadowing, mentoring, internships, entrepreneurships, service learning, workplace tours, apprenticeship, school-based enterprises, Supervised Agricultural Experience (SAE)
Industry Certifications	OSHA 10 Hour Safety Certification (General Industry), National Career Readiness Certificate (NCRC), Registered Parliamentarian
Dual Credit or Dual Enrollment	
Teacher Certification	Agriculture Education
Resources	

Course Description:

Agribusiness Management is a semester-length or year-long high school elective that introduces the business, management, marketing, and financial skills needed to successfully produce food, fiber, and fuel for domestic and global markets. Students will learn about the components of the agribusiness system and how they interact to deliver food to our tables. They will also learn about the key elements of a successful agribusiness enterprise: economics, financial management, marketing and sales, and government policies and regulations. Opportunities for application of clinical and leadership skills are provided by participation in FFA activities, conferences and skills competition such as sales related career development events and proficiency awards. Each student will be expected to maintain a Supervised Agricultural Experience Program/Internship.

Program of Study Application

Agribusiness Management is a second pathway course in the Agriculture, Food and Natural Resources Cluster, Agribusiness Systems Pathway. Agribusiness Management would be preceded by a Agribusiness Sales and Marketing and followed by a Capstone experience.

Course Standards

AM 1 Introduce the components of agribusiness management.

Webb Level	*Sub-indicator*	*Integrated Content*
Three Strategic Thinking	AM 1.1 Explain key business types and management principles and issues for the agribusiness enterprise.	
One Recall	AM 1.2 Present an overview of the knowledge and skills needed to work effectively within the agribusiness enterprises.	
Two Skill/Concept	AM 1.3 Demonstrate leadership skills to accomplish goals and objectives in an agribusiness environment.	

Notes

AM 2 Use record keeping to accomplish AFNR business objectives, manage budgets and comply with laws and regulations. (National AFNR.03)

Webb Level	*Sub-indicator*	*Integrated Content*
Two Skill/Concept	AM 2.1 Distinguish key accounting fundamentals to accomplish dependable bookkeeping and associated files.	
Two Skill/Concept	AM 2.2 Analyze and interpret agricultural policies in relation to their effects on the agribusiness management and agribusiness enterprises.	

Notes

AM 3 Plan a marketing program utilizing various methods for sales of agricultural products. (National AFNR ABS.05)

Webb Level	*Sub-indicator*	*Integrated Content*
Two Skill/Concept	AM 3.1 Explore strategies for optimum marketing of agricultural commodities.	
Four Extended Thinking	AM 3.2 Analyze budget and forecast models to determine optimal business marketing, strategies, and performances.	

Notes

AM 4 Manage cash budgets, credit budgets, and credit for an AFNR business using generally accepted accounting principles (GAAP). (National #3)

Webb Level	*Sub-indicator*	*Integrated Content*
Three Strategic Thinking	AM 4.1 Develop, assess and manage cash budgets to achieve AFNR business goals.	
Three Strategic Thinking	AM 4.2 Analyze credit needs and manage credit budgets to achieve AFNR business goals.	

Notes

Fundamental Plant Science

Career Cluster	Agriculture, Food and Natural Resources
Course Code	18051
Prerequisite(s)	Recommended: Introduction to AFNR
Credit	.5
Graduation Requirement	No
Program of Study and Sequence	Cluster Course – **Fundamental Plant Science** – Advanced Plant Science (Agronomy) or Advanced Horticulture
Student Organization	National FFA Organization
Coordinating Work-Based Learning	Job shadowing, mentoring, internships, entrepreneurships, service learning, workplace tours, apprenticeship, school-based enterprises, Supervised Agricultural Experience (SAE)
Industry Certifications	OSHA 10 Hour Safety Certification (General Industry), National Career Readiness Certificate (NCRC), Commercial Pesticide Applicator Certification, Private Pesticide Applicator Certification
Dual Credit or Dual Enrollment	
Teacher Certification	Agriculture Education
Resources	

Course Description:

The plant science industry is a large part of the economic structure in South Dakota, from crop and forage production, to horticulture and forestry. Every corner of South Dakota is involved in the plant science field. In this course, students develop the necessary knowledge, skills, habits and attitudes for both entry-level employment and advancement in areas such as production agriculture, research, and horticulture, including the soft skills necessary to be successful. Topics covered in this course include plant anatomy and physiology, environmental impacts and plant growth, production and harvesting, and employability skills. Classroom and laboratory content may be enhanced by utilizing appropriate equipment and technology. Algebra, biology, English and human relations skills will be reinforced in the course. Fundamental Plant Science is reinforced through the FFA and Supervised Agricultural Experience (SAE) activities such as the Agronomy Career Development Event and related Proficiency Awards. Each student will be expected to maintain a SAE.

Program of Study Application

Career Cluster: AFNR

Course: Fundamental Plant Science

Fundamental Plant Science is a first pathway course in the Agriculture, Food and Natural Resources Program of Study, Plant Systems pathway. Fundamental Plant Science is preceded by a Cluster course and would be followed by Advanced Plant Science (Agronomy) or Advanced Horticulture.

Course Standards

PS 1 Explain principles of anatomy and physiology in plants.

Webb Level	*Sub-indicator*	*Integrated Content*
One Recall	PS 1.1 Describe functional differences in plant structures including roots, stems, flowers, leaves, and fruits.	• Identify plant parts and functions. • Contrast between monocotyledon and dicotyledon. • Describe types of root systems. • Identify plant growth stages. • Describe the absorption process. • Paraphrase photosynthesis. • Describe respiration. • Explain the transpiration process.

One Recall	PS 1.2 Classify and identify plants.	• Explain agricultural plants and their uses. • Recognize major crops of South Dakota. • Classify plants as monocots or dicots. • Classify plants as annuals, biennials, or perennials. • Identify common and noxious weeds. • Classify growth characteristics of weeds.

Notes

PS 2 Manipulate the environment to promote optimal growth in plants.

Webb Level	*Sub-indicator*	*Integrated Content*
Two Skill/Concept	PS 2.1 Determine nutritional requirements for optimal plant growth.	• Experiment with plant growth regulators. • Compare plant nutritional requirements. • Illustrate the nitrogen cycle. • Differentiate plant nutrient deficiency symptoms. • Describe nutrient application methods and appropriate practices. • Summarize effects of water quality and conditions on plant growth.

Two Skill/Concept	PS 2.2 Examine data to evaluate and manage soil/media and nutrients.	• Test soil/media and plant tissue for nutrient levels. • Interpret tests of soil/media and/or plant tissue. • Compare soil slopes, textures and structures. • Experiment with soil/media permeability and water-holding capacity. • Compare environmental factors that influence and optimize plant growth. • Determine land use capability.

Notes

PS 3 Evaluate fundamentals of production and harvesting of plants.

Webb Level	*Sub-indicator*	*Integrated Content*
Two Skill/Concept	PS 3.1 Analyze a production plan for optimal plant production.	• Identify factors affecting crop selection. • Compare methods for seedbed preparation. • Examine method of seeding. • Compare conventional, reduced-tillage and no-till concepts. • Investigate sustainable and conventional methods of pest and weed management. • Identify technology and equipment used in plant production.
Two Skill/Concept	PS 3.2 Compare the basic methods for reproducing and propagating plants.	• Examine the methods of vegetative reproduction. • Experiment with plant germination rate factors. • Compare methods of asexual/sexual plant propagation. • Examine methods of plant pollination. • Distinguish between the components and functions of plant reproductive parts.
Two Skill/Concept	PS 3.3 Examine fundamentals to harvest, handle, store, and market crops.	• Compare agronomic and horticultural crops. • Examine crop maturity. • Appraise methods of crop harvesting. • Compare crop storage facilities. • Monitor crop quality in storage.

Notes

PS 4 Explore employability skills within the plant science industry.

Webb Level	*Sub-indicator*	*Integrated Content*
Two Skill/Concept	PS 4.1 Develop soft skills to enhance employability.	

Notes

Advanced Plant Science

Career Cluster	Agriculture, Food and Natural Resources
Course Code	18057
Prerequisite(s)	Fundamental Plant Science AND/OR Fundamental Horticulture, Recommended: Introduction to AFNR,
Credit	.5
Graduation Requirement	N
Program of Study and Sequence	Fundamental Plant Science – **Advanced Plant Science** – Ag Biotechnology
Student Organization	National FFA Organization
Coordinating Work-Based Learning	Job shadowing, mentoring, internships, entrepreneurships, service learning, workplace tours, apprenticeship, school-based enterprises, Supervised Agricultural Experience (SAE)
Industry Certifications	OSHA 10 Hour Safety Certification (General Industry), National Career Readiness Certificate (NCRC), Commercial Pesticide Applicator Certification, Private Pesticide Applicator Certification
Dual Credit or Dual Enrollment	
Teacher Certification	Agriculture Education
Resources	

Course Description:

The plant science industry is a large part of the economic structure in South Dakota, especially crop and forage production. Every corner of South Dakota is involved in the plant science field. In Advanced Plant Science, students develop the necessary knowledge, skills, habits and attitudes for both entry-level employment and advancement within agronomy and related plant science occupations. Topics include plant anatomy, physiology, and classification, sustainability in agronomic operations, pest management, and employability skills. Classroom and laboratory content may be enhanced by utilizing appropriate equipment and technology. Algebra, biology, English and human relations skills will be reinforced in the course. Advanced Plant Science is reinforced through the FFA and Supervised Agricultural Experience (SAE) activities such as the Agronomy Career Development Event and related Proficiency Awards. Each student will be expected to maintain a SAE.

Program of Study Application

Advanced Plant Science is a second pathway course in the Agriculture, Food and Natural Resources Program of Study, Plant Systems pathway. Advanced Plant Science is preceded by a Fundamental Plant Science and would be followed by Ag Biotechnology.

Career Cluster: AFNR

Course: Advanced Plant Science

Course Standards

ADPS 1 Recognize principles of plant anatomy, classification, and physiology for the production and management of agronomic plants.

Webb Level	*Sub-indicator*	*Integrated Content*
One Recall	ADPS 1.1 Classify plants according to taxonomy, life cycles, and plant use.	• Compare range, crop, and horticultural plants • Differentiate between major economic crops
Two Skill/Concept	ADPS 1.2 Compare the benefits and risks of genetically modified plants (GMO).	
Two Skill/Concept	ADPS 1.3 Apply knowledge of seed, fruit, and vegetative parts optimal for plant reproduction.	

Notes

ADPS 2 Employ the principles and practices of sustainable agriculture in a plant-based operation.

Webb Level	*Sub-indicator*	*Integrated Content*
Two Skill/Concept	ADPS 2.1 Incorporate the fundamentals of plant management and sustainable agriculture.	
Three Strategic Thinking	ADPS 2.2 Evaluate a fertilizer plan for specific plants or crops.	
Three Strategic Thinking	ADPS 2.3 Evaluate data to manage range and pastures.	
Three Strategic Thinking	ADPS 2.4 Examine growth of a plant to determine when and how a crop should be harvested and stored.	
Three Strategic Thinking	ADPS 2.5 Evaluate crop and harvest success for future planning.	

Notes

ADPS 3 Analyze a pest management system.

Webb Level	*Sub-indicator*	*Integrated Content*
Two Skill/Concept	ADPS 3.1 Identify pest chemicals by formulation and use.	
Three Strategic Thinking	ADPS 3.2 Develop integrated pest management strategies to manage pest populations.	
Two Skill/Concept	ADPS 3.3 Understand the safe handling, mixing and application of chemicals.	

Notes

ADPS 4 Develop employability skills related to the Plant Systems Pathway.

Webb Level	*Sub-indicator*	*Integrated Content*
Two Develop	ADPS 4.1 Develop soft skills to enhance employability.	

Notes

Fundamental Horticulture

Career Cluster	Agriculture, Food and Natural Resources
Course Code	18052
Prerequisite(s)	Recommended: Introduction to AFNR
Credit	.5
Graduation Requirement	No
Program of Study and Sequence	Cluster Course – **Fundamental Horticulture** – Advanced Horticulture or Advanced Plant Science
Student Organization	National FFA Organization
Coordinating Work-Based Learning	Job shadowing, mentoring, internships, entrepreneurships, service learning, workplace tours, apprenticeship, school-based enterprises, Supervised Agricultural Experience (SAE)
Industry Certifications	OSHA 10 Hour Safety Certification (General Industry), National Career Readiness Certificate (NCRC), Commercial Pesticide Applicators Certification, Private Pesticide Applicators Certification
Dual Credit or Dual Enrollment	
Teacher Certification	Agriculture Education
Resources	

Course Description:

Fundamental Horticulture is designed to give students a background in horticultural science and the many career opportunities in nursery, garden, turf and landscape industries. Fundamental Horticulture addresses the biology and genetics involved in production, processing, and marketing of horticulture. Quality nursery and landscape operations require skilled, educated employees. In this course, students develop the necessary knowledge and skills for both entry-level employment and advancement within the horticulture industries. Topics covered include classifying and identifying plants, physiology and propagation, pest management, understanding soil, environmental, and fertility factors affecting plant growth, various horticulture industry sectors, and employability skills. Classroom and laboratory content may be enhanced by utilizing appropriate equipment and technology. Mathematics, biology, English and human relations skills will be reinforced in the course. This class is reinforced through the FFA and Supervised Agricultural Experience (SAE) activities such as the Nursery/Landscape and Floriculture Career Development Events, and related Proficiency Awards. Each student will be expected to maintain a SAE.

Program of Study Application

Fundamental Horticulture is a first pathway course in the Agriculture, Food and Natural Resources Program of Study, Plant Systems pathway. Fundamental Horticulture is preceded by a Cluster course and would be followed by Advanced Horticulture or Advanced Plant Science.

Career Cluster: AFNR

Course: Fundamental Horticulture

Course Standards

HORT 1 Explain horticultural plant classifications.

Webb Level	*Sub-indicator*	*Integrated Content*
One Recall	HORT 1.1 Classify and identify horticultural plants.	• Classify plants using botanical growth habits, landscape uses, culture requirement, and a simple botanical key. • Discuss plant selection and identification for local landscape applications. • Identify landscaping plants. • Identify vegetables and fruits. • Identify floriculture crops. • Identify trees and shrubs. • Identify plants using a dichotomous key.

Notes

HORT 2 Define basic principles of plant physiology and propagation.

Webb Level	*Sub-indicator*	*Integrated Content*
One Recall	HORT 2.1 Explain basic principles of plant physiology and growth.	• Describe photosynthesis, osmosis, transpiration, respiration, plant and cell structures. • Illustrate the factors affecting plant growth. • Identify plant parts and their functions. • Choose potted foliage and flower plants for varied light levels. • Interpret plant growth deficiencies.
Two Skill/Concept	HORT 2.2 Demonstrate the propagation of plants by sexual and asexual methods.	• Maintain dormant plants. • Propagate plants by seeds. • Transplant seedlings at the appropriate two leaf stage. • Plant bulbs and force to bloom. • Propagate plants in a soilless media. • Plan planting schedules. • Propagate plants by taking cuttings and by division.

Notes

HORT 3 Describe pest management in the horticultural industry.

Webb Level	*Sub-indicator*	*Integrated Content*
	HORT 3.1 Identify principles of pest management.	• Identify common plant diseases, insects, and weeds. • Describe methods of pest control for a specific pest. • Identify the proper chemicals for a specific application. • Discuss the requirements for pesticide applicators certification. • List the steps in chemical application. • List and compare the biological pest control methods. • Discuss integrated pest management.

Notes

HORT 4 Analyze soil, environment, and fertility properties as they affect plant growth.

Webb Level	*Sub-indicator*	*Integrated Content*
	HORT 4.1 Examine soil and planting media management.	• Distinguish soil mix materials and characteristics. • Compare and contrast the effect soil structure and texture have on water-holding ability. • Experiment with soil amendments. • Test soil pH. • Select soil media. • Sterilize soil/soilless media. • Experiment with outdoor seedbed preparation.
	HORT 4.2 Examine the growing environment and its effect on plant growth.	• Analyze water, light, and air quality. • Temperature, humidity, etc.
	HORT 4.3 Identify plant nutrition practices for horticulture plants as they relate to plant growth and health.	• Select fertilizers based on analysis. • Identify primary plant nutrients: Nitrogen, Phosphorous, and Potassium. • Test soil mix for fertility by using a soil testing kit. • Read and interpret fertilizer labels and use proper application practices.

Notes

HORT 5 Examine horticulture industry sectors.

Webb Level	*Sub-indicator*	*Integrated Content*
	HORT 5.1 Investigate the care and maintenance of vegetable/fruit crops.	
	HORT 5.2 Investigate the floriculture industry.	
	HORT 5.3 Investigate the nursery/landscape industry.	
	HORT 5.4 Investigate the care and management of turf grass.	

Notes

HORT 6 Develop employability skills related to the Plant Systems Pathway.

Webb Level	*Sub-indicator*	*Integrated Content*
Two Skill/Concept	HORT 6.1 Develop soft skills to enhance employability.	

Notes

Advanced Horticulture

Career Cluster	Agriculture, Food and Natural Resources
Course Code	
Prerequisite(s)	Recommended Intro to AFNR, Fundamental Plant Science AND/OR Fundamental Horticulture
Credit	.5 or 1
Graduation Requirement	N
Program of Study and Sequence	Fundamental Horticulture – **Advanced Horticulture** – Ag Biotechnology
Student Organization	National FFA Organization
Coordinating Work-Based Learning	Job shadowing, mentoring, internships, entrepreneurships, service learning, workplace tours, apprenticeship, school-based enterprises, Supervised Agricultural Experience (SAE)
Industry Certifications	OSHA 10 Hour Safety Certification (General Industry), National Career Readiness Certificate (NCRC), Private Pesticide Applicator Certification, Commercial Pesticide Applicator Certification
Dual Credit or Dual Enrollment	
Teacher Certification	Agriculture Education
Resources	

Course Description:

Advanced Horticulture is designed for instructors to customize the curriculum to local industry needs. Standards can be met by utilizing one or more of the following horticulture sectors: Landscape Design, Floriculture and/or Greenhouse Management. Topics include identification, use and management of equipment and materials, as well as managing plant growth and maintaining plants and equipment. Employment skills are an additional emphasis. All three of these industry sectors require skilled, educated employees. Classroom and laboratory content will be enhanced by utilizing appropriate equipment and technology. Mathematics, (geometry), science (physical science, biology, Chemistry), English and human relations skills will be reinforced in the course. Opportunities for application of clinical and leadership skills are provided by participation in FFA through activities, conference and skills competitions. Each student will be expected to maintain a Supervised Agricultural Experience (SAE) program.

Program of Study Application

Advanced Horticulture is a second pathway course in the Agriculture, Food and Natural Resources Program of Study, Plant Systems pathway. Advanced Horticulture is preceded by a Fundamental Horticulture and would be followed by Ag Biotechnology.

Career Cluster: AFNR

Course: Advanced Horticulture

Course Standards

ADVH 1 Identify plants, equipment and materials utilized in the horticulture industry.

Webb Level	*Sub-indicator*	*Integrated Content*
Two Skill/Concept	ADVH 1.1 Identify and categorize plants by their purpose.	• floral plants • landscape plants • house plants • bedding plants
One Recall	ADVH 1.2 Identify tools and equipment used in horticultural industries.	• Floral tools • Landscaping tools and equipment • Greenhouse systems, benches, lights, etc.
One Recall	ADVH 1.3 Identify supplies and materials used in horticulture.	• Floriculture materials & containers • Hardscapes • Growing media, containers

Notes

ADVH 2 Develop and implement a crop management plan.

Webb Level	*Sub-indicator*	*Integrated Content*
Four Extended Thinking	ADVH 2.1 Apply knowledge of plant anatomy and the functions of plant structures to activities associated with plant systems.	• Identify and summarize functions of different plant parts
Three Strategic Thinking	ADVH 2.2 Determine the influence of environmental factors on plants.	• Light • Air temperature • Water
Three Strategic Thinking	ADVH 2.3 Develop and implement a plan for meeting plant nutrient needs.	• Growing media • Fertilization
Four Extended Thinking	ADVH 2.4 Apply plant management practices.	• Trimming/pruning • IPM • Demonstrate care and handling of cut flowers
Two Skill/Concept	ADVH 2.5 Explain principles of specialized growing techniques.	• hydroponics • aquaponics • sustainable methods • Genetically Modified Organisms (GMO) • Biotechnology • types of propagation

Notes

ADVH 3 Apply principles of design in plant systems to enhance an environment.

Webb Level	*Sub-indicator*	*Integrated Content*
Three Strategic Thinking	ADVH 3.1 Select plants based on quality and function.	• Summarize the installation and maintenance of turf grass
Four Extended Thinking	ADVH 3.2 Create designs using plants.	• Floral arrangements • Landscape designs
Four Extended Thinking	ADVH 3.3 Demonstrate proper use of plants in their environment	• focal and filler plants in floriculture • heat tolerant and shade plants in landscape design
Two Skill/Concept	ADVH 3.4 Evaluate a design and provide feedback and suggestions for improvement.	• Evaluate a floral arrangement • Evaluate a landscape or landscape plan

Notes

ADVH 4 Develop employability skills related to the Plant Systems Pathway.

Webb Level	*Sub-indicator*	*Integrated Content*
Two Develop	ADVH 4.1 Develop soft skills to enhance employability.	

Notes