EXPLORING AGRICULTURE

#01005

Description

Exploring Agriculture covers various agricultural topics, including plant and animal science, production, and processing; agricultural mechanics, including tool and machine operation and repair; construction and repair of farm structures; business operations and management; and the careers available in the agricultural industry. Courses may include chemical and soil science, ecology, agricultural marketing, and veterinary science.

Grades 7-8

Standard 1	***AGRICULTURE, FOOD, & NATURAL RESOURCES (AFNR) FOUNDATIONAL PATHWAY SKILLS***	
Topic 1.2	**Examine technologies and analyze their impact on AFNR systems.**	
	Student Competencies	
	1.2.1	Research technologies used in AFNR systems.
	1.2.2	Compare and contrast AFNR systems before and after the integration of technology.
Topic 1.3	**Identify public policies and examine their impact on AFNR systems.**	
	Student Competencies	
	1.3.1	Summarize public policies affecting AFNR systems.
	1.3.2	Identify an AFNR problem that could be solved by public policy.
Topic 1.5	**Examine the impact of AFNR on the local, state, national, and global society and economy.**	
	Student Competencies	
	1.5.1	Identify the components within AFNR systems (e.g., Animal Systems: health, nutrition, genetics, etc.; Natural Resources Systems: soil, water, etc.).
	1.5.2	Describe how cultures on local, state, national, and global levels relate to AFNR systems.
	1.5.3	List the economic elements of the agricultural economy (e.g., environmental, crops, livestock, etc.).
Topic 1.6	**Identify and explain the implications of required regulations to maintain and improve safety, health, and environmental management systems.**	
	Student Competencies	
	1.6.1	Identify implications of regulatory, safety, and health standards on AFNR systems (e.g., SDS, bio-terrorism, etc.)
	1.6.2	Summarize the importance of safety, health, and environmental management in the workplace.
Topic 1.8	**Apply health and safety practices to AFNR workplaces.**	
	Student Competencies	
	1.8.1	Identify emergency response procedures for health and safety issues at AFNR workplaces.
	1.8.2	Identify examples of how to avoid health or safety risks in AFNR workplaces.
	1.8.3	Describe the risk level of contamination or injury as associated with AFNR tasks in the workplace.
Topic 1.9	**Use appropriate protective equipment and demonstrate safe and proper use of AFNR tools and equipment.**	
	Student Competencies	
	1.9.1	Identify and differentiate the appropriate protective equipment for the safe use and operation of specific tools and equipment (e.g. PPE, etc.).
	1.9.2	Identify standard tools, equipment, and safety procedures related to AFNR tasks.

	1.9.3	Outline operating instructions related to operation, storage, and maintenance of tools and equipment related AFNR tasks.
	1.9.4	Demonstrate adherence to protective equipment requirements when using various AFNR tools and equipment.
	1.9.5	Demonstrate the set up and adjustment for tools and equipment related to AFNR tasks.
	1.9.6	Demonstrate appropriate operation, storage, and maintenance techniques for AFNR tools and equipment.
Topic 1.10	**Identify and implement practices to steward natural resources in different AFNR systems.**	
	Student Competencies	
	1.10.1	Illustrate stewardship of natural resources.
	1.10.2	Explain how sustainability relates to AFNR activities.
Topic 1.11	**Assess and explain the natural resource related trends, technologies, and policies that impact AFNR systems.**	
	Student Competencies	
	1.11.1	Discuss historical and current natural resources trends and technologies.
	1.11.2	Identify current local, state, and federal policies impacting AFNR systems.
Topic 1.12	**Evaluate and implement the steps and requirements to pursue a career opportunity in each of the AFNR career pathways (e.g., goals, degrees, certifications, resumes, cover letter, portfolios, interviews, etc.).**	
	Student Competencies	
	1.12.1	Identify steps to pursue a career in an AFNR pathway (e.g., self-assessment, set goals, etc.).
	1.12.2	Classify the educational, training, and experiential requirements to pursue a career in an AFNR pathway (e.g., degrees, certifications, training, internships, etc.).
	1.12.3	Describe specific tools (e.g., resumes, portfolios, cover letters, etc.) and processes (e.g., interviews, applications, etc.) needed to pursue a career in an AFNR pathway.
Topic 1.13	**Examine and choose career opportunities that are matched to personal skills, talents, and career goals in an AFNR pathway of interest.**	
	Student Competencies	
	1.13.1	Describe careers in each of the AFNR pathways.
Topic 1.14	**Examine and explain foundational cycles and systems of AFNR.**	
	Student Competencies	
	1.14.1	Explain the life cycles in AFNR (e.g., water cycle, nutrient cycle, carbon cycle, reproductive, mechanical, etc.).
	1.14.2	Explain the interactions between various AFNR systems (e.g., sustainability, animal, plant, food, natural resource, agribusiness, power structure and technical, and biotechnology , etc.).
Topic 1.15	**Recognize the value of a Supervised Agricultural Experience (SAE) as Work-Based Learning.**	
	Student Competencies	
	1.15.1	Define Supervised Agricultural Experience (SAE).
	1.15.2	Describe the lifelong learning and career skills that SAEs provide.
	1.15.3	List the types of foundational and immersion SAEs.
Topic 1.16	**Implement the components of a Foundational SAE.**	
	Student Competencies	

	1.16.1	Investigate career opportunities based on individual strengths and preferences.
	1.16.2	Identify employability skills that are important in a chosen career field.
	1.16.3	Define record keeping and its relationship to personal financial literacy.
	1.16.4	Define workplace safety and its importance with AFNR.
Topic 1.17	**Recognize the options within and participate in immersive supervised agricultural experiences.**	
	Student Competencies	
	1.17.1	Describe the knowledge and skills required to be successful in a specific AFNR career field.
	1.17.2	Connect record-keeping skills to financial literacy.
Topic 1.18	**Analyze the history of the National FFA Organization and how this timeline has allowed the organization to remain relevant.**	
	Student Competencies	
	1.18.1	Identify key historical moments within FFA's history.
Topic 1.19	**Evaluate the structure and value of agricultural education.**	
	Student Competencies	
	1.19.1	Define classroom instruction, FFA, and Supervised Agricultural Experiences in the context of the three-component model of agricultural education.
	1.19.2	Identify topics explored in an agricultural course.
	1.19.3	Identify important facts and programs of the FFA.
	1.19.4	Identify what is learned in an SAE.
Topic 1.20	**Examine the key components providing directional leadership to the National FFA Organization.**	
	Student Competencies	
	1.20.2	Define an emblem and explain its purpose in an organization.
	1.20.3	Define a mission statement and explain its purpose in an organization.
	1.20.4	Define a program of activities and explain its purpose in an organization.
Topic 1.21	**Analyze the structures and procedures to effectively and professionally run and manage a meeting.**	
	Student Competencies	
	1.21.1	Define parliamentary procedure and terms used in parliamentary procedure (e.g., motion, amendment, adjourn).
	1.21.2	Identify the purpose and components of a debate.
	1.21.3	Identify the purpose of organization documents such as agendas, minutes, constitutions, etc.
Topic 1.22	**Evaluate opportunities to develop leadership, citizenship, and career skills.**	
	Student Competencies	
	1.22.1	Define leadership and identify leadership skills.
	1.22.2	Define citizenship and identify citizenship skills.
	1.22.3	Identify career skills necessary in today's workplace.
	1.22.4	Identify opportunities available to develop leadership skills.

Standard 3	*ANIMAL SYSTEMS*	
Topic 3.1	**Evaluate the development and implications of animal origin, domestication, and distribution on production practices and the environment.**	
	Student Competencies	
	3.1.1	Summarize the origin, significance, distribution, and domestication of different animal species.
	3.1.2	Summarize major components of animal industrial systems (e.g., livestock, small animal, research, etc.).
Topic 3.2	**Assess and select animal production, marketing, and management methods based upon effectiveness and potential social and environmental impacts.**	
	Student Competencies	
	3.2.1	Define terms and methods related to animal production, marketing, and management (e.g., sustainable, conventional, responsibly sourced, quality assurance, natural, organic, etc.).
Topic 3.4	**Explain management techniques that ensure animal welfare.**	
	Student Competencies	
	3.4.1	Explain the difference between animal welfare and animal rights.
	3.4.2	Identify the challenges involved in working with animals and the various resources available (e.g., variety of tools, technology, equipment, facilities, animal behavior signals, etc.).
Topic 3.16	**Select animals for specific purposes and maximum performance based on anatomy and physiology.**	
	Student Competencies	
	3.16.1	Identify optimal anatomical and physiological characteristics according to established breed standards.

Standard 4	*BIOTECHNOLOGY SYSTEMS*	
Topic 4.1	**Investigate and explain the relationships in the timeline of developing biotechnology applications and techniques in agriculture (e.g., major innovators, historical developments, potential applications of biotechnology, etc.).**	
	Student Competencies	
	4.1.1	Diagram the progression of biotechnology and the evolution of scientific knowledge.
	4.1.2	Identify the benefits and risks of biotechnology compared with alternative approaches to improving agriculture.
	4.1.3	Identify careers, skills, and the educational preparation needed for entry level careers in biotechnology.
Topic 4.5	**Identify and apply standard laboratory procedures and equipment maintenance to create and maintain reliable data.**	
	Student Competencies	
	4.5.1	Describe standard operating procedures for laboratory equipment.
	4.5.2	Categorize laboratory equipment according to its purpose in scientific research.
Topic 4.6	**Apply standard operating procedures for the safe handling of biological and chemical materials in a laboratory.**	
	Student Competencies	
	4.6.1	Classify different types of personal protective equipment and demonstrate how to properly utilize the equipment.
Topic 4.7	**Safely manage and dispose of biological materials, chemicals, and wastes according to standard operating procedures.**	
	Student Competencies	
	4.7.1	Describe hazards associated with biological and chemical materials.

Standard 5	*EDUCATION, COMMUNICATION, AND LEADERSHIP*	
Topic 5.1	**Explore the breadth of opportunities in agricultural education (e.g., using state or national resources, Teach Ag, university program information, professional associations, etc.).**	
	Student Competencies	
	5.1.1	Identify various agricultural education careers within and beyond the scope of school-based agricultural education.
Topic 5.2	**Apply fundamental understanding of AFNR and agricultural education - including experiential learning - to the development of a workshop or lesson.**	
	Student Competencies	
	5.2.1	Identify the components of an effective agricultural education, training, and development program.
Topic 5.5	**Demonstrate impactful leadership as a credible resource for AFNR.**	
	Student Competencies	
	5.5.1	Understand personal leadership traits (such as organizational and personal management skills) that contribute to meeting the needs of learners, school, community, the AFNR industry, etc.

Standard 6	*ENVIRONMENTAL SYSTEMS*	
Topic 6.1	**Analyze and interpret laboratory and field samples in environmental sustainability systems.**	
	Student Competencies	
	6.1.1	Identify sample types (e.g., air, water, soil, organism populations, etc.) and sampling techniques used to collect laboratory and field data.
Topic 6.2	**Properly utilize scientific instruments in environmental monitoring situations (e.g., laboratory equipment, environmental monitoring instruments, etc.).**	
	Student Competencies	
	6.2.1	Identify basic laboratory equipment and explain their uses.
	6.2.2	Explain the uses of basic environmental monitoring instruments.
Topic 6.7	**Apply soil science and hydrology principles to environmental sustainability systems.**	
	Student Competencies	
	6.7.1	Define land uses, capability factors, and land capability classes.
	6.7.2	Describe the process of soil formation through weathering.
	6.7.3	Explain how the physical qualities of soil influence the infiltration and percolation of water.
	6.7.4	Define groundwater and its importance on environmental sustainability systems.
Topic 6.10	**Apply ecology principles to environmental sustainability systems.**	
	Student Competencies	
	6.10.1	Describe the role that biodiversity plays in environmental sustainability systems and how biodiversity can be measured.
	6.10.2	Explain the role played by habitats on environmental sustainability systems.
Topic 6.14	**Compare and contrast the impact of conventional and alternative energy sources on the environment and operation of environmental sustainability systems.**	
	Student Competencies	
	6.14.1	List conventional energy sources and conservation measures to reduce the impact on environmental sustainability systems.
	6.14.2	Describe alternative energy sources and the motivations for seeking alternatives to conventional energy sources as they relate to environmental monitoring.

Standard 7	***FOOD PRODUCTS AND PROCESSING SYSTEMS***	
Topic 7.1	**Distinguish between various food safety programs and management systems in food products and processing facilities.**	
	Student Competencies	
	7.1.1	Summarize the purposes and objectives of safety programs in food products and processing facilities (e.g., Sanitation Standard Operating Procedures (SSOP); Good Manufacturing Practices (GMP); worker safety, etc.).
	7.1.2	Identify common equipment used in food products and processing systems (e.g., packaging, mixing, cooling, heating, preservation, etc.) and describe their function.
Topic 7.3	**Apply food safety procedures during storage and distribution to ensure food quality.**	
	Student Competencies	
	7.3.1	Summarize purposes of food storage procedures (e.g., first in/first out, temperature regulation, monitoring, etc.).
Topic 7.4	**Apply principles of nutrition and biology to develop food products that provide a safe, wholesome, and nutritious food supply for local and global food systems.**	
	Student Competencies	
	7.4.1	Summarize properties of common food constituents (e.g., proteins, carbohydrates, fats, vitamins, minerals).
	7.4.2	Describe methods of nutritional planning to meet essential needs for the human diet.
Topic 7.6	**Apply principles of human behavior to develop food products to provide a safe, wholesome, and nutritious food supply for local and global food systems.**	
	Student Competencies	
	7.6.1	Explain the importance of food labeling to the consumer.
Topic 7.8	**Design and apply techniques of food processing, preservation, packaging, and presentation for distribution and consumption of food products.**	
	Student Competencies	
	7.8.1	Explain English and metric measurements used in the food products and processing industry.
Topic 7.9	**Create food distribution plans and procedures to ensure safe delivery of food products.**	
	Student Competencies	
	7.9.2	Describe the various paths food products take to get from food processing centers to consumers.
Topic 7.11	**Evaluate the significance and implications of changes and trends in the food products and processing industry in the local and global food systems.**	
	Student Competencies	
	7.11.1	Describe the components of the food products and processing industry (e.g., processing, distribution, byproducts, etc.).
	7.11.2	Explain environmental and safety concerns about the food supply.
Topic 7.12	**Identify the purpose of industry organizations, groups, and regulatory agencies that influence the local and global food systems.**	

Student Competencies		
	7.12.1	Summarize the purposes of organizations that influence or regulate the food products and processing industry.
	7.12.2	Describe the importance and usage of regulatory oversight of food safety and security in food products and processing (e.g., internationally, nationally, state, and local).

Standard 8	*NATURAL RESOURCES SYSTEMS*	
Topic 8.1	**Examine natural resource availability and ecosystem function in a particular region.**	
	Student Competencies	
	8.1.1	Describe the process for classifying the different kinds of natural resources using common classification schemes (e.g., abiotic/biotic, renewable versus nonrenewable, native versus introduced, etc.).
	8.1.2	Summarize the components that comprise types of ecosystems (e.g., marine systems, desert systems, forest systems, etc.).
	8.1.3	Explain the importance of biodiversity to ecosystem function and availability of natural resources.
Topic 8.2	**Classify different types of natural resources in order to enable protection, conservation, enhancement, and management in a particular geographical region.**	
	Student Competencies	
	8.2.1	Define the characteristics used to identify trees and woody plants.
	8.2.2	Define the characteristics used to identify herbaceous plants.
	8.2.3	Define the characteristics used to identify wildlife and insects.
	8.2.4	Define the characteristics used to identify aquatic species.
	8.2.5	Define the characteristics used to identify abiotic resources (e.g., soil types, climate, geography, etc.).
Topic 8.6	**Apply ecological concepts and principles to biotic organisms in natural resource systems.**	
	Student Competencies	
	8.6.1	Describe the importance of population ecology, population density, and population dispersion to natural resource systems.
	8.6.2	Identify examples of invasive species.
Topic 8.8	**Assess the impact of human activities on the availability of natural resources.**	
	Student Competencies	
	8.8.1	Summarize the relationship between natural resources, ecosystems, and human activity.

Standard 9	***PLANT SYSTEMS***	
Topic 9.2	**Prepare and adjust growing media for use in plant systems.**	
	Student Competencies	
	9.2.1	Describe the major forms of growing media (e.g., hydroponics, soil, greenhouse potting mix, rockwool, etc.).
Topic 9.3	**Demonstrate planting techniques and create the conditions needed for seed germination.**	
	Student Competencies	
	9.3.1	Describe the steps to growing crops including crop selection, land preparation, seed selection, seed sowing, irrigation, fertilizing, and harvesting.
Topic 9.5	**Classify plants according to taxonomic systems.**	
	Student Competencies	
	9.5.1	Identify plants based on visual characteristics (e.g., seedling stages, fully grown, etc.).
Topic 9.6	**Apply knowledge of plant anatomy and the functions of plant structures to activities associated with plant systems.**	
	Student Competencies	
	9.6.2	Identify the components, the types, and the functions of plant roots.
	9.6.3	Identify the components and the functions of plant stems.
	9.6.4	Identify morphological features found in leaves, how they contribute to plant identification, and how they relate to overall plant growth.
	9.6.5	Describe the components of a flower, the functions of a flower, and the functions of flower components.
	9.6.6	Identify the functions and components of seeds and fruits.
Topic 9.12	**Harvest crops according to industry standards.**	
	Student Competencies	
	9.12.1	Identify harvesting methods and equipment.

Standard 10	***POWER, STRUCTURAL, AND TECHNICAL SYSTEMS***	
Topic 10.1	**Apply physical science and engineering principles to assess and select energy sources for AFNR power, structural, and technical systems.**	
	Student Competencies	
	10.1.1	Identify renewable and nonrenewable energy sources used in AFNR.
Topic 10.2	**Apply physical science and engineering principles to design, implement and improve safe and efficient mechanical systems in AFNR situations.**	
	Student Competencies	
	10.2.2	Identify the tools, machines, and equipment needed to construct, fabricate, and/or repair projects in AFNR.
	10.2.3	Identify the types of safety hazards associated with different mechanical systems used in AFNR using appropriate sources (e.g., owner's manuals, Safety Data Sheet (SDS), chemical labels, pesticide labels, safety color codes, etc.).
Topic 10.4	**Perform preventative maintenance and scheduled service to maintain equipment, machinery, and power units used in AFNR settings.**	
	Student Competencies	
	10.4.1	Identify the importance of cleanliness and appearance of equipment, machinery, and power units used in AFNR power, structural and technical systems to ensure proper functionality.
Topic 10.5	**Operate machinery and equipment while observing all safety precautions in AFNR settings.**	
	Student Competencies	
	10.5.1	Summarize the safe use of equipment, machinery, and power units.
	10.5.2	Identify safety hazards associated with equipment, machinery and power units used in AFNR power, structural, and technical systems (e.g., caution, warning, danger, etc.).