Grades 6-8

Agriculture Business Standards ABS

1 **Students will use economic principles to establish and manage an AFNR enterprise.** ABS1

- a Apply principles of capitalism in the business environment. ABS1.A
  - 1 Recognize principles of capitalism as related to AFNR businesses. ABS1.A.1.M
- b Apply principles of entrepreneurship in businesses. ABS1.B
  - 1 Classify the characteristics of successful entrepreneurs in AFNR businesses. ABS1.B.1.M

2 **Students will use appropriate management planning principles in AFNR business enterprise.** ABS2

- a Compose and analyze a business plan for an enterprise. ABS2.A
  - 3 Recognize quality AFNR business plan components that have been developed using the SMART (specific, measurable, attainable, realistic and timely) format. ABS2.A.3.M
  - 4 Identify and observe ethical standards in planning and operating AFNR businesses. ABS2.A.4.M
- b Read, interpret, evaluate and write a mission statement to guide business goals, objectives and resource allocation. ABS2.B
  - 3 Read and interpret mission statements. ABS2.B.3.M
  - 4 Identify the meaning and importance of goals and objectives in AFNR business enterprises. ABS2.B.4.M
- c Apply appropriate management skills to organize a business. ABS2.C
  - 2 Identify organizational structures and chains of command in AFNR businesses. ABS2.C.2.M
  - 3 Identify appropriate local, state, federal, international and industry regulations for AFNR businesses. ABS2.C.3.M
- d Recruit, train and retain appropriate and productive human resources for businesses. ABS2.D
  - 5 Identify the meaning and functions of human resources in AFNR businesses. ABS2.D.5.M
  - 6 Identify usual employee benefits in AFNR businesses. ABS2.D.6.M
  - 7 Explain the meaning and importance of employee relations, including communication. ABS2.D.7.M
  - 8 Identify the meaning and nature of employee compensation. ABS2.D.8.M

3 **Students will use record keeping to accomplish AFNR business objectives while complying with laws and regulations.** ABS3

- a Prepare and maintain all files needed to accomplish effective record keeping. ABS3.A
  - 2 Maintain production and agribusiness records. ABS3.A.2.M
- b Implement appropriate inventory management practices. ABS3.B
  - 2 Monitor inventory to maintain optimal levels and calculate costs of carrying input and output inventory. ABS3.B.2.M

4 **Students will apply generally accepted accounting principles and skills to manage cash budgets, credit budgets and credit for AFNR businesses.** ABS4

- a Use accounting fundamentals to accomplish dependable bookkeeping and fiscal management. ABS4.A
  - 2 Budget resources, as applied to the AFNR business, including capital, human, financial and time. ABS4.A.2.M
  - 3 Identify financial concepts associated with production and profit. ABS4.A.3.M
  - 4 Explain the importance of return on investment for an agribusiness enterprise. ABS4.A.4.M

5 **Students will access accomplishment of goals and objectives by an AFNR business.** ABS5

- a Maintain and interpret financial information (i.e., income statements, balance sheets, inventory, purchase orders, accounts receivable and cash-flow analyses) for businesses. ABS5.A
  - 4 Identify accounting information in AFNR business reporting and management. ABS5.A.4.M
  - 5 Name and explain the impact of external economic factors on an AFNR business. ABS5.A.5.M
  - 6 Identify information needed for an AFNR business manager to monitor performance on a daily, weekly, monthly, quarterly and annual basis. ABS5.A.6.M

6 **Students will use industry-accepted marketing principles to accomplish AFNR business objectives.** ABS6

- a Conduct appropriate market and marketing research. ABS6.A
  - 3 Investigate the meaning and methods of marketing in AFNR as related to agricultural commodities, products and services and to agricultural goods in domestic and international markets. ABS6.A.3.M
  - 4 Describe functions in agricultural marketing. ABS6.A.4.M
- b Develop a marketing plan. ABS6.B
  - 2 Identify the purpose, components and developmental processes of marketing plans. ABS6.B.2.M
- c Develop strategies for marketing plan implementation. ABS6.C
  - 2 Identify and use strategies frequently employed in marketing programs, including those used in niche markets. ABS6.C.2.M
- d Develop specific tactics to market AFNR products and services. ABS6.D
  - 2 Identify and maintain needed sales records. ABS6.D.2.M

7 **Students will create a production system plan.** ABS7

a Prepare a step-by-step production plan that identifies needed resources. ABS7.A

2 Prepare a flowchart that shows production processes, including the resources needed for each step. ABS7.A.2.M

b Develop a production and operational plan. ABS7.B

2 Identify the components of a production and operational plan. ABS7.B.2.M

3 Identify common resources needed to operate a production facility ABS7.B.3.M

c Use appropriate techniques to determine the most likely strengths, weaknesses and inconsistencies in a business plan and relate these to risk management strategies. ABS7.C

1 Examine a business plan to identify inconsistencies and actions to correct inconsistencies. ABS7.C.1.M

d Manage risk and uncertainty. ABS7.D

2 Determine the meaning and importance of risk and uncertainty with AFNR enterprises. ABS7.D.2.M

Animal Systems AS

1 **Students will examine the components, historical development, global implications and future trends of the animal systems industry.** AS1

a Evaluate the development and implications of animal origin, domestication and distribution. AS1.A

3 Identify the origin, significance, distribution and domestication of animal species. AS1.A.3.M

4 Define major components of the animal industry. AS1.A.4.M

2 **Students will classify, evaluate, select and manage animals based on anatomical and physiological characteristics.** AS2

- a Classify animals according to hierarchical taxonomy and agricultural use. AS2.A
  - 2 Explain the importance of the binomial system of nomenclature. AS2.A.2.M
  - 3 Identify major animal species by common and scientific names. AS2.A.3.M
- b Apply principles of comparative anatomy and physiology to uses within various animal systems. AS2.B
  - 2 Identify, diagram and describe characteristics of animal cells, tissues organs and body systems in growth and reproduction. AS2.B.2.M
  - 3 Describe the properties, locations, functions and types of animal tissues. AS2.B.3.M
  - 4 Describe the properties, locations, functions and types of animal organs. AS2.B.4.M
  - 5 Describe the functions of the animal body systems and system components. AS2.B.5.M
- c Select animals for specific purposes and maximum performance based on anatomy and physiology. AS2.C
  - 2 Identify ways an animal's health can be affected by anatomical and physiological disorders. AS2.C.2.M
  - 3 Create a program to develop an animal to its highest potential performance. AS2.C.3.M

3 **Students will provide for the proper health care of animals.** AS3

- a Prescribe and implement a prevention treatment program for animal diseases, parasites and other disorders. AS3.A
  - 4 Explain methods of determining animal health and disorders. AS3.A.4.M
  - 5 Identify common diseases, parasites and physiological disorders that affect animals. AS3.A.5.M
  - 6 Explain characteristics of causative agents and vectors of diseases and disorders in animals. AS3.A.6.M
  - 7 Explain the clinical significance of common considerations in veterinary treatments, such as aseptic techniques. AS3.A.7.M
- b Identify bio-security threats and provide for the bio-security of agricultural animals and production facilities. AS3.B
  - 2 Identify and describe zoonotic diseases. AS3.B.2.M
  - 3 Explain the importance of biosecurty to the animal industry. AS3.B.3.M

4 **Students will apply principles of animal nutrition to ensure the proper growth, development, reproduction and economic production of animals.** AS4

- a Formulate feed rations to provide for the nutritional needs of animals. AS4.A
  - 2 Compare and contrast common types of feedstuffs and the roles they play in the diets of animals. AS4.A.2.M
  - 3 Explain the importance of a balanced ration for animals. AS4.A.3.M
- b Prescribe and administer animal feed additives and growth promotants in animal production. AS4.B
  - 2 Explain the purpose and benefits of feed additives and growth promotants in animal production. AS4.B.2.M

5 **Students will evaluate and select animals based on scientific principles of animal production.** AS5

- a Evaluate the male and females reproductive systems in selecting animals. AS5.A
  - 2 Explain the male and female reproductive organs of the major animal species. AS5.A.2.M
- b Evaluate animals for breeding readiness and soundness. AS5.B
  - 1 Explain how age, size, life cycle, maturity level and health statuses affect the reproductive efficiency of male and female animals. AS5.B.1.M
- c Describe how selection and geographical regions impact the economic decisions of our livestock business. AS5.C
  - 2 Discuss the importance of efficient and economic reproduction in animals. AS5.C.2.M
- d Apply scientific principles in the selection and breeding of animals. AS5.D
  - 2 Explain genetic inheritance in agricultural animals. AS5.D.2.M
- f Compare and contrast scientific methods associated with animal reproduction. AS5.F
  - 2 Define natural and artificial breeding methods. AS5.F.2.M
  - 3 Explain the use of quantitative breeding values (e.g., EPDs) in the selection of genetically superior breeding stock. AS5.F.3.M
  - 4 Explain the advantages of major reproductive management practices, including estrous synchronization, superovulation, flushing and embryo transfer. AS5.F.4.M
  - 5 Discuss the uses, advantages and disadvantages of natural breeding and artificial insemination. AS5.F.5.M

6 **Students will prepare and implement animal handling procedures for the safety of animals, producers and consumers of animal products.** AS6

- a Demonstrate safe animal handling and management techniques. AS6.A
  - 2 Discuss the dangers involved in working with animals. AS6.A.2.M
  - 3 Explain the implications of animal welfare and animal rights for animal agriculture. AS6.A.3.M
- b Implement procedures to ensure that animal products are safe. AS6.B
  - 2 Identify animal production practices that could pose health risks or are considered to pose risks by some. AS6.B.2.M
  - 3 Describe how animal identification systems can track an animal's location, nutrition requirements, production progress and changes in health. AS6.B.3.M

7 **Students will select animal facilities and equipment that provide for the safe and efficient production, housing and handling of animals.** AS7

- a Design animal housing, equipment and handling facilities for the major systems of animal production. AS7.A
  - 2 Identify facilities needed to house and produce each animal species safely and efficiently. AS7.A.2.M
  - 3 Identify equipment and handling facilities used in modern animal production. AS7.A.3.M
- b Comply with government regulations and safety standards for facilities used in animal production. AS7.B
  - 1 List the general standards (e.g., environmental, zoning, construction) that must be met in facilities for animal production. AS7.B.1.M

8 **Students will analyze environmental factors associated with animal production.** AS8

- a Reduce the effects of animal production on the environment. AS8.A
  - 2 Evaluate the effects of animal agriculture on the environment. AS8.A.2.M
- b Evaluate the effects of environmental conditions on animals. AS8.B
  - 1 Identify optimal environmental conditions for animals. AS8.B.1.M

Biotechnology Systems BT

1 **Students will recognize the historical, social, cultural and potential applications of biotechnology.** BT1

- a Distinguish major innovators, historical developments and potential applications of biotechnology in agriculture. BT1.A
  - 2 Define biotechnology and explore the historical impact it has had on agriculture. BT1.A.2.M
  - 3 Investigate current applications of biotechnology in agriculture. BT1.A.3.M
  - 4 Examine potential future applications of biotechnology in agriculture and compare them with alternative approaches to improving agriculture. BT1.A.4.M
- b Analyze the ethical, legal, social and cultural issues relating to biotechnology. BT1.B
  - 3 Describe the role of agencies that regulate biotechnology. BT1.B.3.M
  - 4 Explore ethical, legal and social biotechnology issues. BT1.B.4.M
  - 5 Explore the emergence, evolution and implications of bioethics. BT1.B.5.M
  - 6 Explain the meaning of intellectual properties as related to biotechnology. BT1.B.6.M

2 **Students will demonstrate laboratory skills as applied to biotechnology.** BT2

- a Demonstrate safe and proper laboratory procedures and record keeping using biological materials. BT2.A
  - 7 Maintain a biotechnology laboratory notebook. BT2.A.7.M
  - 8 Operate basic laboratory equipment and measurement devices. BT2.A.8.M
  - 9 Demonstrate basic aseptic techniques in the biotechnology laboratory. BT2.A.9.M
  - 10 Perform procedures with biological materials according to directions. BT2.A.10.M
  - 11 Identify and describe hazards associated with biological and chemical materials. BT2.A.11.M
  - 12 Maintain a safe environment by properly identifying and disposing of laboratory waste. BT2.A.12.M
- b Perform microbiology, molecular biology, enzymology and immunology procedures. BT2.B
  - 6 Differentiate the types of organisms and demonstrate how to handle them safely. BT2.B.6.M
  - 7 Explain the structures of DNA and RNA and how genotype influences phenotype. BT2.B.7.M
  - 8 Extract and purify DNA and RNA. BT2.B.8.M
  - 9 Perform simple enzyme activity assays to detect proteins. BT2.B.9.M
  - 10 Describe how antibodies are formed and how they can be used in biotechnology applications. BT2.B.10.M
  - 11 Explain reasons for detecting microbes and identify sources of microbes. BT2.B.11.M
- c Evaluate the application of genetic engineering to improve products of AFNR systems. BT2.C
  - 3 Explain biological, social, agronomic and economic reasons for genetic modification of eukaryotes. BT2.C.3.M
  - 4 Describe enzymes, the changes they cause in foods and the physical and chemical parameters that affect enzymatic reactions. BT2.C.4.M
  - 5 Compare and contrast the use of natural organisms and genetically engineered organisms in the treatment of wastes. BT2.C.5.M
  - 6 Describe the benefits and risks associated with the use of biotechnology to increase productivity and improve quality of aquatic species. BT2.C.6.M
- d Perform biotechnology processes used in AFNR systems. BT2.D
  - 7 Explain the functions of hormones in animals. BT2.D.7.M
  - 8 Identify foods produced through fermentation. BT2.D.8.M
  - 9 Explain the process of fermentation. BT2.D.9.M

10 Explain the process of transesterification. BT2.D.10.M

11 Explain biomass and sources of biomass. BT2.D.11.M

12 Explain the process of methanogenesis. BT2.D.12.M

f Use biotechnology to monitor and evaluate procedures performed in AFNR systems. BT2.F

7 Describe the selective plant breeding process. BT2.F.7.M

8 Describe biotechnology processes applicable to animal health. BT2.F.8.M

9 Give examples of instances in which bioremediation can be applied to clean up environmental contaminants. BT2.F.9.M

10 Explain the use of microorganisms in biological waste management and industrial chemical waste treatment. BT2.F.10.M

11 Explain the global importance of biodiversity. BT2.F.11.M

12 Explain the consequences of agricultural practices on wild populations. BT2.F.12.M

13 Define industrial biotechnology and describe the benefits and risks associated with its use in the manufacturing of fabrics, plastics and other products. BT2.F.13.M

Environmental Service Systems ESS

1 **Students will use analytical procedures to plan and evaluate environmental service systems while assessing the impact of policies and regulations on environmental service systems.** ESS1

a Analyze and interpret samples. ESS1.A

3 Determine the appropriate sampling techniques needed, explain the importance of unbiased sampling and collection of samples. ESS1.A.3.M

4 Identify basic laboratory equipment and environmental monitoring instruments and explain their uses. ESS1.A.4.M

b Interpret laws affecting environmental service systems. ESS1.B

2 Identify laws associated with Wisconsin environmental service systems. ESS1.B.2.M

2 **Students will apply scientific principles to environmental service systems.** ESS2

a Apply meteorology principles to environmental service systems. ESS2.A

5 Identify components and structural layers of the earth's atmosphere. ESS2.A.5.M

6 Explain how meteorological conditions influence air quality. ESS2.A.6.M

7 Explain and recognize signs of climate change within Wisconsin. ESS2.A.7.M

8 Explain the Earth's balance of energy. ESS2.A.8.M

b Apply soil science and microbiology principles to environmental service systems. ESS2.B

7 Explain the process of soil formation through weathering. ESS2.B.7.M

8 Describe the biodiversity found in soil and the contribution of biodiversity of the physical and chemical characteristics of soil. ESS2.B.8.M

9 Explain how the physical qualities of the soil influence the infiltration and percolation of water. ESS2.B.9.M

10 Identify land uses, capability factors and land capability classes. ESS2.B.10.M

11 Identify the basic structures of microorganisms and the major groups of microorganisms. ESS2.B.11.M

12 Define the purposes of bioassay tests. ESS2.B.12.M

c Apply hydrology principles to environmental service systems. ESS2.C

7 Describe the world's water supplies and discuss water uses. ESS2.C.7.M

8 Demonstrate knowledge of hydrogeology by differentiating between ground and surface water. ESS2.C.8.M

9 Define groundwater potential. ESS2.C.9.M

10 Identify environmental hazards associated with groundwater supplies. ESS2.C.10.M

11 Discuss factors that influence the velocity of water through an open channel. ESS2.C.11.M

12 Identify the operational components of a pumping or fluid movement system. ESS2.C.12.M

d Apply best management techniques associated with the properties, classifications and functions of wetlands. ESS2.D

5 Describe the functions of wetlands and differentiate the types of wetlands. ESS2.D.5.M

6 Identify the major types of living organisms that inhabit wetlands. ESS2.D.6.M

7 Explain the importance of wetland management, creation, enhancement and restoration programs. ESS2.D.7.M

8 Explain basic chemistry principals. ESS2.D.8.M

3 **Students will operate environmental service systems to manage a facility environment.** ESS3

a Use pollution control measures to maintain a safe facility environment. ESS3.A

3 Identify types of pollution and distinguish between point and nonpoint source pollution. ESS3.A.3.M

4 Describe ways in which pollution can be managed and prevented. ESS3.A.4.M

b Manage safe disposal of all categories of solid waste. ESS3.B

7 Describe different types of solid wastes. ESS3.B.7.M

8 Discuss practical management options for treating solid wastes. ESS3.B.8.M

9 Explain sanitary landfill. ESS3.B.9.M

10 Define composts and composting. ESS3.B.10.M

11 Explain the basic concepts associated with solid waste incineration. ESS3.B.11.M

12 Explain the importance of recycling. ESS3.B.12.M

c Apply the principles of public drinking water treatment operations to ensure safe water at a facility. ESS3.C

3 Identify chemical and physical properties of drinking water. ESS3.C.3.M

4 Define source water quality and assessment steps. ESS3.C.4.M

d Apply principles of wastewater treatment to manage wastewater disposal in keeping with rules and regulations. ESS3.D

3 Diagram the steps in wastewater treatment. ESS3.D.3.M

4 Identify types of hazardous material. ESS3.D.4.M

4 **Students will examine the relationships between energy sources and environmental service system with a basic understanding of the use of tools, equipment, machinery and technology to accomplish tasks in environmental service systems.** ESS4

a Compare and contrast the impact of conventional and alternative energy sources on the environment. ESS4.A

3 Explain energy and ways in which it can be used. ESS4.A.3.M

4 Identify alternative energy sources. ESS4.A.4.M

b Use technological and mathematical tools to map land, facilities and infrastructure with inclusion of basic maintenance knowledge related to tools, equipment and machinery in safe working order for tasks in environmental service systems. ESS4.B

3 Explain the importance of surveying and mapping for environmental service systems. ESS4.B.3.M

4 Demonstrate proper use and maintenance of hand tools. ESS4.B.4.M

Food Production and Processing FPP

1 **Students will examine components of the food industry and historical development of food products and processing.** FPP1

a Evaluate the significance and implications of changes and trends in the food products and processing industry. FPP1.A

3 Discuss the history and describe and explain the components (e.g., processing, distribution, byproducts) of the food products and processing industry. FPP1.A.3.M

4 Identify the issues of safety and environmental concerns about foods and food processing (e.g., Genetically Modified Organisms, microorganisms, contamination, irradiation). FPP1.A.4.M

b Work effectively with industry organizations, groups and regulatory agencies affecting the food products and processing industry. FPP1.B

3 Evaluate the changes in the food products and processing industry brought about by industry organizations or regulatory agencies. FPP1.B.3.M

4 Discuss the application of industry standards in the food products and processing industry. FPP1.B.4.M

2 **Students will apply safety principles; recommend equipment and facility management techniques to the food products and processing industry.** FPP2

a Manage operational procedures and create equipment and facility maintenance plans. FPP2.A

3 Explain the importance of developing and maintaining Sanitation Standard Operating Procedures (SSOP). FPP2.A.3.M

4 Explain and evaluate the purpose of Good Manufacturing Practices (GMP). FPP2.A.4.M

5 Develop a basic equipment and facility maintenance program. FPP2.A.5.M

b Implement Hazard Analysis and Critical Control Point (HACCP) procedures to establish operating parameters. FPP2.B

3 Outline procedures to eliminate possible contamination hazards associated with food products and processing. FPP2.B.3.M

4 Identify and Explain the implementation of the seven principles of HACCP. FPP2.B.4.M

c Apply safety and sanitation procedures in the handling, processing and storing of food products. FPP2.C

5 Evaluate food product handling procedures. FPP2.C.5.M

6 Describe and perform quality-assurance tests on food products. FPP2.C.6.M

7 Explain the importance of microbiological tests in food product preparation, listing common spoilage and pathogenic microorganisms. FPP2.C.7.M

8 Discuss documentation procedures in a food products and processing system. FPP2.C.8.M

d Demonstrate worker safety procedures with food product and processing equipment and facilities. FPP2.D

2 Outline guidelines for personnel safety in the food products and processing industry. FPP2.D.2.M

3 **Students will apply principles of science to the food products and processing industry.** FPP3

a Apply principles of science to food processing to provide a safe, wholesome and nutritious food supply FPP3.A

8 Design a research project in food science using the scientific method. FPP3.A.8.M

9 Determine the chemical and physical properties of food products. FPP3.A.9.M

10 Design a daily food guide for a healthful diet. FPP3.A.10.M

11 Compare and contrast food constituents and their relative value to product taste, appearance, etc. FPP3.A.11.M

12 Describe the purpose of common food additives. FPP3.A.12.M

13 Explain the required components of a food label. FPP3.A.13.M

14 Plan and create a new food product. FPP3.A.14.M

4 **Students will select and process food products for storage, distribution and consumption.** FPP4

a Use harvesting, selection and inspection techniques to obtain quality food products for processing. FPP4.A

5 Discuss factors that affect quality and yield grades of food products. FPP4.A.5.M

6 Select raw food products perform quality-control inspections of raw food products for processing. FPP4.A.6.M

7 Compare and contrast industry approved production animal care and treatment. FPP4.A.7.M

8 Explain characteristics of animals in relation to food production. FPP4.A.8.M

b Evaluate, grade and classify processed food products. FPP4.B

4 Discuss desirable qualities of processed meat, egg, poultry, fish and dairy products. FPP4.B.4.M

5 Discuss desirable qualities of fruit and vegetable products. FPP4.B.5.M

6 Discuss desirable qualities of grain, legume and oilseed products. FPP4.B.6.M

c Process, preserve, package and present food and food products for sale and distribution. FPP4.C

7 Weigh and measure food products and perform conversions between units of measure. FPP4.C.7.M

8 Demonstrate how fresh foods are prepared for distribution. FPP4.C.8.M

9 Explain the processes of food preservation methods. FPP4.C.9.M

10 Research the steps involved in the creation of ready- to-eat food products. FPP4.C.10.M

11 Explain the science behind packaging materials in storing processed foods and raw food products. FPP4.C.11.M

12 Determine appropriate methods and conditions for storing raw and processed food products based on their characteristics. FPP4.C.12.M

Natural Resources NR

1 **Students will explain interrelationships between natural resources and humans necessary to conduct management activities in natural environments.** NR1

a Apply knowledge of natural resource components to the management of natural resource systems. NR1.A

3 Differentiate between renewable and nonrenewable natural resources. NR1.A.3.M

4 Define ecosystem and related terms. NR1.A.4.M

b Classify natural resources. NR1.B

6 Describe morphological characteristics used to identify trees and other woody plants. NR1.B.6.M

7 Explain morphological characteristics used to identify herbaceous plants. NR1.B.7.M

8 Compare and contrast wildlife species. NR1.B.8.M

9 Compare and contrast aquatic species. NR1.B.9.M

10 Demonstrate techniques used to identify rock, mineral and soil differences. NR1.B.10.M

2 **Students will apply scientific principles to natural resource management activities.** NR2

a Use cartographic skills to aid in developing, implementing and evaluating natural resource management plans, measure and survey for natural resource status in developing related plans with interpretation of laws related to natural resource management and protection. NR2.A

4 Identify hazards associated with the outdoor environment. NR2.A.4.M

5 Recognize biohazards associated with natural resources. NR2.A.5.M

6 Demonstrate how to use maps to identify directions and features, calculate actual distance and determine the elevations of points. NR2.A.6.M

b Apply ecological concepts and principles to natural resource systems. NR2.B

4 Describe the value of resource inventories and population studies. NR2.B.4.M

5 Identify laws associated with natural resource systems. NR2.B.5.M

6 Define mitigation. NR2.B.6.M

c Demonstrate natural resource enhancement techniques. NR2.C

7 Categorize the different kinds of streams. NR2.C.7.M

8 Generate characteristics of a healthy forest. NR2.C.8.M

9 Identify characteristics of a healthy wildlife habitat. NR2.C.9.M

10 Identify characteristics of a healthy rangeland. NR2.C.10.M

11 Identify natural resource characteristics desirable for recreational purposes. NR2.C.11.M

12 Identify characteristics of healthy marine and coastal natural resources. NR2.C.12.M

d Apply ecological concepts and principles to natural resource systems. NR2.D

8 Illustrate biogeochemical cycles. NR2.D.8.M

9 Describe properties of watersheds and identify the boundaries of local watersheds. NR2.D.9.M

10 Compare and contrast groundwater and surface-water flow. NR2.D.10.M

11 Define riparian zones and riparian buffers and explain their functions. NR2.D.11.M

12 Describe the processes associated with ecological succession. NR2.D.12.M

13 Explain population ecology, population density and population dispersion. NR2.D.13.M

14 Define invasive species along with pollution descriptions and delineation between point and nonpoint source pollutions with descriptions of climatic factors that influence natural resources. NR2.D.14.M

3 Students will apply knowledge of natural resources to production and processing industries. NR3

a Produce, harvest, process and use natural resource products. NR3.A

8 List tree species and describe related uses and harvesting methods. NR3.A.8.M

9 Identify wildlife and aquatic species that can be commercially and or sustainably harvested for commercial and recreational purposes. NR3.A.9.M

10 Identify uses and products obtained from wildlife and aquatic species. NR3.A.10.M

11 Describe the value of minerals and ores to the economy. NR3.A.11.M

12 Describe the value of fossil fuels to the economy. NR3.A.12.M

13 Describe the benefits of hydroelectric generation. NR3.A.13.M

14 Identify recreational uses of natural resources. NR3.A.14.M

4 Students will demonstrate techniques used to protect natural resources. NR4

a Manage fires in natural resource systems. NR4.A

2 Differentiate between desirable and undesirable fires and prepare a report on the role fire plays in a healthy ecosystem. NR4.A.2.M

b Diagnose plant and wildlife diseases and follow protocol to prevent their spread while acquiring management protocol of insect infestations of natural resources. NR4.B

4 Identify causes of diseases in plants. NR4.B.4.M

5 Identify causes of diseases in wildlife. NR4.B.5.M

6 Identify harmful and beneficial insects and signs of insect damage to natural resources. NR4.B.6.M

5 **Students will use effective methods and venues to communicate natural resource processes to the public.** NR5

a Communicate natural resource information to the public. NR5.A

2 Identify ways in which a message regarding natural resources may be communicated to the public. NR5.A.2.M

Plant Systems PS

1 Students will apply knowledge of plant classification, anatomy and physiology to the production and management of plants. PS1

a Classify agricultural plants according to taxonomy systems. PS1.A

4 Explain systems used to classify plants and compare and contrast the hierarchical agricultural plants. PS1.A.4.M

5 Identify major groups of plants based on physiological characteristics. PS1.A.5.M

6 Identify agriculturally important plants by common names. PS1.A.6.M

b Apply knowledge of plant anatomy and the functions of plant structures to activities associated with plant systems. PS1.B

3 Diagram a typical plant cell and identify plant cell organelles and their functions. PS1.B.3.M

4 Identify the components, the types and the functions of plant roots. PS1.B.4.M

5 Identify the components and the functions of plant stems. PS1.B.5.M

m. Discuss leaf morphology and the functions of leaves. PS1.B.6.M

7 Identify the components of a flower, the functions of a flower and the functions of flower components. PS1.B.7.M

8 Explain the functions and components of seeds and fruit and describe ways they may be carried through the environment. PS1.B.8.M

c Apply energy conversion to plant systems. PS1.C

3 Explain the basic process of photosynthesis and its importance to life on Earth. PS1.C.3.M

4 Explain requirements necessary for photosynthesis to occur and identify the products and byproducts of photosynthesis. PS1.C.4.M

d Apply knowledge of plant physiology to plant systems. PS1.D

3 Compare and contrast monocot and dicot seed and plant growth characteristics. PS1.D.3.M

4 Identify different types of plant growth regulators and forms of tropism. PS1.D.4.M

2 **Students will prepare and implement a plant management plan that addresses the influence of environmental factors, nutrients and soil on plant growth.** PS2

a Determine the influence of environmental factors on plant growth. PS2.A

3 Describe the qualities of light that affect plant growth. PS2.A.3.M

4 Describe the effects air; temperature and water have on plant metabolism and growth. PS2.A.4.M

5 Determine the optimal air, temperature and water conditions for plant growth. PS2.A.5.M

b Prepare growing media for use in plant systems. PS2.B

3 Identify the major components of growing media and describe how growing media support plant growth. PS2.B.3.M

4 Compare and contrast different plant medias. PS2.B.4.M

c Develop and implement a fertilization plan for specific plants, field crops and/or greenhouse crops. PS2.C

3 Identify the essential nutrients for plant growth and development and their major functions and monitor plants for signs of nutrient deficiencies. PS2.C.3.M

4 Adjust the pH of growing media. PS2.C.4.M

5 Collect soil and plant tissue samples for testing and interpret the test results. PS2.C.5.M

m. Identify fertilizer sources of essential plant nutrients, explain fertilizer formulations and describe different methods of fertilizer application. PS2.C.6.M

3 **Students will propagate, culture and harvest plants.** PS3

a Demonstrate plant propagation techniques. PS3.A

3 Explain pollination, cross-pollination and self-pollination of flowering plants. PS3.A.3.M

4 Diagram the process of plant fertilization. PS3.A.4.M

5 Design and implement a plan to control the pollination of plants. PS3.A.5.M

6 Handle seed to overcome seed dormancy mechanisms and to maintain seed viability and vigor. PS3.A.6.M

7 Describe optimal conditions for asexual propagation and demonstrate techniques used to propagate plants by cuttings, division, separation and layering. PS3.A.7.M

8 Give examples of the risks and advantages associated with genetically modified plants. PS3.A.8.M

b Develop and implement a plant management plan for crop production. PS3.B

4 Explain the importance of starting with pest- and disease-free propagation material. PS3.B.4.M

5 Explain the reasons for preparing growing media before planting. PS3.B.5.M

6 Prepare soil for planting with the addition of amendments. PS3.B.6.M

7 Apply pre-plant treatments required of seeds and plants and evaluate the results. PS3.B.7.M

8 Observe and record environmental conditions during the germination, growth and development of a crop. PS3.B.8.M

9 Monitor the progress of plantings and determine the need to adjust environmental conditions. PS3.B.9.M

c Develop and implement a plan for integrated pest management. PS3.C

3 Identify types of plant pests and disorders. PS3.C.3.M

4 Identify major local weeds, insect pests and infectious and noninfectious plant diseases. PS3.C.4.M

5 Design and implement a crop scouting program. PS3.C.5.M

6 Describe damage caused by plant pests and diseases. PS3.C.6.M

7 Diagram the life cycles of major plant pests and diseases. PS3.C.7.M

d Apply principles and practices of sustainable agriculture to plant production. PS3.D

1 Explain sustainable agriculture and objectives associated with the strategy. PS3.D.1.M

2 Describe sustainable agriculture practices and compare the ecological effects of traditional agricultural practices with those of sustainable agriculture. PS3.D.2.M

e Harvest, handle and store crops. PS3.E

3 Identify harvesting methods and harvesting equipment. PS3.E.3.M

4 Identify storage methods for plants and plant products. PS3.E.4.M

5 Assess the stage of growth to determine crop maturity or salability and demonstrate proper harvesting techniques. PS3.E.5.M

6 Explain the reasons for preparing plants and plant products for distribution. PS3.E.6.M

7 Demonstrate techniques for grading, handling and packaging plants and plant products for distribution. PS3.E.7.M

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4 Students will employ elements of design to enhance an environment. PS4

a Create designs using plants. PS4.A

3 Define, design and identify design elements. PS4.A.3.M

4 Discuss the applications of art in agriculture/horticulture. PS4.A.4.M

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5 Students will recognize different systems in which plants grow. PS5

a Investigate various means to grow plants. PS5.A

2 Compare and contrast growing plants in soil versus growing plants in water. PS5.A.2.M

Power, Structural and Technical Systems PST

1 **Students will demonstrate competence in the application of principles and techniques for the development and management of power, structural and technical systems.** PST1

a Select energy sources in power generation appropriate to the situation. PST1.A

2 Examine environmental impacts and efficiencies of energy sources. PST1.A.2.M

b Apply physical science laws and principles to identify, classify and use lubricants. PST1.B

2 Classify lubricants by SAE viscosity and API service classifications. PST1.B.2.M

c Identify and use hand and power tools and equipment for service, construction and fabrication. PST1.C

2 Select, maintain and use hand and power tools in service, construction and fabrication. PST1.C.2.M

d Perform service routines to maintain power units and equipment. PST1.D

4 Identify a maintenance schedule for power equipment. PST1.D.4.M

5 Service filtration systems and maintain fluid levels on power units and equipment. PST1.D.5.M

6 Develop a preventive maintenance schedule for power units and equipment. PST1.D.6.M

7 Identify power unit and equipment controls and instruments, along with their functions. PST1.D.7.M

8 Locate safety warnings, dangers and caution areas on equipment and in the operation manuals. PST1.D.8.M

e Identify the principles of operation and the systems of small engines. PST1.E

2 Observe safety precautions when working around small engines. PST1.E.2.M

3 Distinguish between two and four stroke engines. PST1.E.3.M

4 Identify the mechanical systems found in small engines. PST1.E.4.M

f Troubleshoot and repair internal combustion engines. PST1.F

4 Use technical manuals and computer-based diagnostics in engine analysis and repair. PST1.F.4.M

5 Identify tools used to repair internal combustion engines. PST1.F.5.M

g Use manufacturers' guidelines to service and repair the power transmission systems of equipment. PST1.G

2 Apply and use mechanical advantages of simple machines. PST1.G.2.M

3 Identify power transfer principles, including those using friction, gears and fluids. PST1.G.3.M

h Service and repair hydraulic and pneumatic systems. PST1.H

2 Describe principles of hydraulic and pneumatic system operation. PST1.H.2.M

3 Identify major components of hydraulic and pneumatic systems and describe their use. PST1.H.3.M

4 Identify hydraulic and pneumatic system fittings and ports. PST1.H.4.M

l Troubleshoot and service electrical systems. PST1.I

2 Apply the meaning and measurement of electricity, including amperage, voltage and wattage. PST1.I.2.M

j Create sketches and plans of agricultural structures. PST1.J

2 Develop plans and sketches using drafting equipment and computer programs. PST1.J.2.M

3 Use scale measurement and dimension to develop plans and sketches. PST1.J.3.M

k Apply structural plans, specifications and building codes. PST1.K

2 Identify and interpret different views of a construction drawing. PST1.K.2.M

l Examine structural requirements for materials and procedures and estimate construction cost. PST1.L

2 Select types of materials, determine quantities and estimate their costs and other costs associated with a specified project plan. PST1.L.2.M

m Follow architectural and mechanical plans to construct and/or repair equipment, buildings and facilities. PST1.M

4 Install and/or repair pipes and plumbing equipment and fixtures. PST1.M.4.M

5 Distinguish electrical circuits and components of each. PST1.M.5.M

6 Measure and calculate fencing materials. PST1.M.6.M

7 Identify insulation materials and methods to achieve desired R-value. PST1.M.7.M

8 Calculate volume for concrete projects. PST1.M.8.M

n Use arc, MIG/TIG welders, equipment and materials needed to weld. PST1.N

5 Distinguish types of electric welding machines. PST1.N.5.M

6 Recognize, color and numerical code marking on electrodes. PST1.N.6.M

7 Identify safety equipment and protective clothing for welding. PST1.N.7.M

8 Describe types of welding operations. PST1.N.8.M

o Use gas welding equipment and materials to weld. PST1.O

2 Identify the parts of gas welding equipment and it safe use. PST1.O.2.M

3 Point out parts of a gas welding system. PST1.O.3.M

4 Explain the uses of brazing and gas welding. PST1.O.4.M

5 Identify the parts of a oxyfuel cutting system. PST1.O.5.M

p Apply the use of welding to agricultural related industries. PST1.P

2 Distinguish welding processes, positions and materials preparation. PST1.P.2.M

q Apply electrical wiring principles in agricultural applications. PST1.Q

4 Interpret maintenance schedules for electrical control systems (Thermostat, light sensors etc.). PST1.Q.4.M

5 Identify hazards and safety related to the materials and tools used in electrical control circuit installation. PST1.Q.5.M

r Apply technology principles in the use of agricultural technical systems. PST1.R

2 Use common computer-based programs to analyze agricultural data. PST1.R.2.M

s Use geospatial technologies in agricultural applications. PST1.S

2 Explain and evaluate concepts and principles of geospatial technologies. PST1.S.2.M

3 Describe equipment and processes used in geospatial technologies. PST1.S.3.M

4 Identify uses, components and setup of precision technology in agriculture, food and natural resources. PST1.S.4.M

5 Describe the meaning and use of sensors, controllers and actuators. PST1.S.5.M