## Agricultural and Environmental Systems Career Field

## Veterinary Science

**Subject Code: 010930**

**Outcome & Competency Descriptions**

**Course Description:**

Students will learn about the causes, symptoms, and treatment of common diseases with special emphasis on developing preventative health management plans and breeding programs. Topics include veterinary pharmacology, radiology imaging techniques, principles of surgery, safe laboratory skills, and the concepts of ethics and professionalism in the workplace. Students will develop skills in inquiry and statistical methods. Throughout the course, learners will utilize principles of technology to manage information systems, and research issues affecting the industry.

**Strand 1. Business Operations/21st Century Skills**

Learners apply principles of economics, business management, marketing and employability in an entrepreneur, manager and employee role to the leadership, planning, developing and analyzing of business enterprises related to the career field.

**Outcome: 1.1. Employability Skills**

Develop career awareness and employability skills (e.g., face-to-face, online) needed for gaining and maintaining employment in diverse business settings.

**Competencies**

1.1.1. Identify the knowledge, skills and abilities necessary to succeed in careers.

1.1.2. Identify the scope of career opportunities and the requirements for education, training, certification, licensure and experience.

**Outcome: 1.2. Leadership and Communications**

Process, maintain, evaluate and disseminate information in a business. Develop leadership and team building to promote collaboration.

**Competencies**

1.2.1. Extract relevant, valid information from materials and cite sources of information.

1.2.2. Deliver formal and informal presentations.

1.2.4. Use negotiation and conflict-resolution skills to reach solutions.

1.2.5. Communicate information (e.g., directions, ideas, vision, workplace expectations) for an intended audience and purpose.

1.2.6. Use proper grammar and expression in all aspects of communication.

1.2.7. Use problem-solving and consensus-building techniques to draw conclusions and determine next steps.

1.2.10. Use interpersonal skills to provide group leadership, promote collaboration and work in a team.

1.2.11. Write professional correspondence, documents, job applications and resumés.

1.2.12. Use technical writing skills to complete forms and create reports.

**Outcome: 1.3. Business Ethics and Law**

Analyze how professional, ethical and legal behavior contributes to continuous improvement in organizational performance and regulatory compliance.

**Competencies**

1.3.1. Analyze how regulatory compliance (e.g., United States Department of Agriculture [USDA], Food and Drug Administration [FDA], United States Department of Interior [USDI], Ohio Livestock Care Standards, water quality standards, local water regulations, building codes) affects business operations and organizational performance.

1.3.2. Follow protocols and practices necessary to maintain a clean, safe and healthy work environment.

1.3.3. Use ethical character traits consistent with workplace standards (e.g., honesty, personal integrity, compassion, justice).

1.3.5. Access and implement safety compliance measures (e.g., quality assurance information, safety data sheets [SDSs], product safety data sheets [PSDSs], United States Environmental Protection Agency [EPA], United States Occupational Safety and Health Administration [OSHA]) that contribute to the continuous improvement of the organization.

**Outcome: 1.4. Knowledge Management and Information Technology**

Demonstrate current and emerging strategies and technologies used to collect, analyze, record and share information in business operations.

**Competencies**

1.4.1. Use office equipment to communicate (e.g., phone, radio equipment, fax machine, scanner, public address systems).

1.4.7. Use personal information management and productivity applications to optimize assigned tasks (e.g., lists, calendars, address books).

**Outcome: 1.5. Global Environment**

Evaluate how beliefs, values, attitudes and behaviors influence organizational strategies and goals.

**Competencies**

1.5.2. Describe how cultural intelligence skills influence the overall success and survival of an organization.

1.5.4. Recognize barriers in cross-cultural relationships and implement behavioral adjustments.

**Outcome: 1.6. Business Literacy**

Develop foundational skills and knowledge in entrepreneurship, financial literacy and business operations.

**Competencies**

1.6.1. Identify business opportunities.

1.6.2. Assess the reality of becoming an entrepreneur, including advantages and disadvantages (e.g., risk versus reward, reasons for success and failure).

1.6.3. Explain the importance of planning your business.

**Outcome: 1.8. Operations Management**

Plan, organize and monitor an organization or department to maximize contribution to organizational goals and objectives.

**Competencies**

1.8.5. Use inventory and control systems to purchase materials, supplies and equipment (e.g., Last In, First Out [LIFO]; First In, First Out [FIFO]; Just in Time [JIT]; LEAN).

1.8.8. Identify routine activities for maintaining business facilities and equipment.

1.8.9. Develop a budget that reflects the strategies and goals of the organization.

**Outcome: 1.10. Sales and Marketing**

Manage pricing, place, promotion, packaging, positioning and public relations to improve quality customer service.

**Competencies**

1.10.2. Determine the customer's needs and identify solutions.

1.10.3. Communicate features, benefits and warranties of a product or service to the customer.

**Outcome: 1.12. Site and Personal Safety Procedures**

Follow site and personal safety procedures in specific situations with specialized tools and equipment, evaluate the situation and take corrective action.

**Competencies**

1.12.1. Use Occupational Safety and Health Administration (OSHA) defined procedures for identifying

employer and employee responsibilities, working in confined spaces, managing worker safety

programs, using ground fault circuit interrupters (GFCIs), maintaining clearance and boundaries and labeling.

1.12.7. Select, use, store, maintain and dispose of personal protective equipment (PPE), appropriate to job tasks, conditions and materials.

1.12.8. Identify safety hazards and take corrective measures.

1.12.9. Identify, inspect and use safety equipment appropriate for the task.

1.12.10. Follow established procedures for the administration of first aid and contact emergency medical personnel when necessary.

**Strand 2. Animal Science**

Learners apply principles of animal anatomy, physiology, genetics, behavior, nutrition and production to the research and development, selection and reproduction, health and management of animals in domestic and natural environments.

**Outcome: 2.1. Nutrition**

Analyze, formulate, prepare and administer a ration for a population of specific animal species based on economics, nutrition and availability of feedstuffs and evaluate the feed’s effects on animals and animal products.

**Competencies**

2.1.2. Describe the role of nutrients and nutritional requirements of different animal life processes and species.

2.1.4. Identify and address major nutrient deficiency and toxicity symptoms.

2.1.8. Select and determine the feeding and watering practices and systems, based on the animal population, purpose and requirement.

**Outcome: 2.2. Body Systems**

Describe the interrelationships of animal body systems with growth, development, health, maintenance, reproduction and production.

**Competencies**

2.2.1. Describe external anatomical parts and their functions within different species.

2.2.2. Compare and contrast the anatomical parts of the digestive system(s) and describe their physiology within different species.

2.2.3. Identify anatomical components of nerve tissue and the nervous system, including regions of the brain, spinal nerves and the sympathetic and parasympathetic system, and describe their physiology.

2.2.4. Identify the anatomical components of the skeletal system, including the types and forms of bones, and describe their physiology.

2.2.5. Identify the anatomical components of the musculature systems, including striated, cardiac and smooth muscle, and describe their physiology.

2.2.6. Compare and contrast bone growth, muscle growth, and fat deposition in relation to developmental patterns.

2.2.7. Describe the components of the cardiovascular system and their functions, including factors affecting blood flow.

2.2.8. Identify and describe the physical characteristics, components and functions of blood.

2.2.9. Identify and describe the integumentary system (e.g., skin, hair, nails, wool, feathers, scales), related structures, functions and cycles.

2.2.10. Identify and describe the function and components of the respiratory system and pulmonary ventilation and the factors influencing respiratory rates.

2.2.11. Identify and describe the urinary system structure and function, including excretion and osmoregulation.

2.2.12. Compare and contrast between the male and female reproductive system, structures and function.

2.2.13. Describe the endocrine system, its structure and the role of hormones.

2.2.14. Identify and describe the immune system and the lymphatic system’s role in immunity.

2.2.15. Identify the anatomy and describe the physiology of the mammary system.

**Outcome: 2.3. Care and Management**

Apply animal care, management and record procedures to ensure husbandry and welfare, including managing environmental conditions to ensure animal health and performance.

**Competencies**

2.3.10. Recognize common restraints and tack devices for handling including their use and adjustments.

2.3.14. Identify and recognize normal and abnormal dental structures and conditions.

**Outcome: 2.4. Recognizing Diseases and Disorders**

Evaluate animal conditions for species-specific diseases and disorders to assess an animal’s health and welfare.

**Competencies**

2.4.1. Identify common infectious and noninfectious causes of diseases and disorders within different species.

2.4.2. Identify abnormalities in the skeleton, body form and functions and identify associated symptoms.

2.4.3. Describe the clinical signs that are associated with an abnormality caused by environmental factors (e.g. heat stress, standing condition, air quality).

2.4.4. Assess clinical signs of animals and identify diseases caused by microorganisms (e.g., parasites, viruses, bacteria, fungi, protozoa).

2.4.5. Describe zoonotic diseases and explain the health risk on humans and animals.

2.4.6. Implement disease prevention methods and procedures including the use of personal protective equipment.

2.4.7. Utilize voided specimens to determine animal health by performing urinalysis and fecal floatation with centrifugation.

2.4.8. Understand the principles of imaging and diagnostics through the use of X-ray and ultrasound equipment and techniques.

2.4.10. Differentiate between active and passive immunities and identify immunization schedule per species.

**Outcome: 2.5. Animal Health**

Implement preventive measures, treatment and maintenance options for species-specific diseases and disorders to improve an animal’s health and welfare.

**Competencies**

2.5.1. Obtain and interpret an animal's vitals.

2.5.2. Apply concepts of body condition scoring to assess an animal's general health and nutrition status.

2.5.3. Recognize the preventative measures or treatments needed to maintain animal health.

2.5.4. Apply basic principles of first-aid.

2.5.5. Inventory, store and dispose of pharmaceutical drugs by category, class and label.

2.5.6. Describe the routes of administration for medications (oral, IM, IV, SQ) and the process of drug absorption, distribution, metabolism, withdrawal and excretion.

2.5.7. Interpret and follow label directions for the dosage, route of administration and withdrawal period.

2.5.8. Simulate the administration of drug treatments and vaccines, following quality assurance guidelines, and monitor common adverse effects and potential problems associated with administration.

2.5.9. Prepare a sterile surgical environment, prepare patients for surgery and conduct post-operative procedures.

2.5.10. Describe advantages, disadvantages and adverse side effects of commonly used preanesthetic and anesthetic agents.

2.5.11. Identify and prepare sterile surgical instruments commonly used for surgery and post-operative procedures.

**Outcome: 2.6. Population Management**

Manage reproduction practices in animal populations across habitats to achieve the desired outcomes and specific goals.

**Competencies**

2.6.4. Identify normal and abnormal signs of parturition and recommend appropriate management practices.

2.6.5. Understand the rationale to manipulate an animal’s reproductive processes to support breeding (e.g., sex-sorted semen, heat synchronization, nutritional flushing, light cycling, natural and selected breeding).

2.6.6. Understand the rationale for selecting breeding methods (e.g., artificial insemination, embryo transfer, natural selection, selective breeding, invitro fertilization, cloning).

2.6.8. Describe ethical and responsible animal population management practices (e.g., spaying, neutering, heat suppression, relocation, reintroduction, hunting, containment, culling, euthanasia).

**Strand 3: Biotechnology**

Learners engage in the scientific process, learn fundamental processes using modern tools and laboratory techniques, adhere to safety protocols, and bring a biotechnology product to the market.

**Outcome: 3.1 Research and Experiments**

Use scientific methodology to conduct problem-based studies, develop products, and interpret results.

**Competencies**

3.1.1. Design a research plan, including the significance of the problem, purpose, hypotheses, objectives, appropriate controls, independent variables, dependent variables, methods of study and a list of materials.

3.1.3. Apply sampling methods that appropriately represent the population, and implement

procedures for systematic data collection.

3.1.5. Document results of the experiment in a laboratory notebook, including a statement of purpose, experimental design, observations, results, conclusions and next steps.

3.1.7. Compute measures of central tendency to interpret results and draw conclusions.

3.1.10. Describe the relationships among variables using correlations and draw conclusions.

3.1.11. Draw conclusions based on observations and data analyses, recognizing that experimental results must be open to the scrutiny of others.

3.1.12. Prepare and present findings using scientific reports.

**Strand 4 Power Systems**

Learners apply principles of tool use, power transmission, hydraulics, two- and four-stroke cycle combustion, exhaust, ignition, fuel, starting and charging, steering, HVAC, and lubrication systems to operate, maintain and repair equipment.

**Outcome 4.1 Tool, Stationary and Mobile Equipment Maintenance**

Inspect, clean, maintain and perform preventative maintenance on equipment**.**

**Competencies**

4.1.2. Identify types of hand tools, power tools and equipment and describe their functions.

**Strand 5: Elements of Production**

Learners apply principles of practice related to the management and maintenance of food, agriculture and natural resources systems.

**Outcome: 5.15 Animal Behavior**

Apply management practices to assure quality animal care, considering species-specific behaviors, human safety, social influences, public perception and regulations associated with animal welfare.

**Competencies**

5.15.1. Understand social influences, public perception and regulations that are associated with animal welfare.

5.15.2. Describe the adaptations and special senses (e.g., sight, hearing, smell, touch) of animals and how they contribute to animal behavior.

5.15.3. Identify and describe the innate behavioral patterns of animals.

5.15.4. Describe social relationships involved in behavioral adjustment and adaptation (e.g., animal-to-animal and human-to-animal interaction).

5.15.5. Interpret an animal’s intent based on its vocalization, body posture and chemical means of

communication.

5.15.6. Recognize behavior abnormalities and recommend corrective action.

5.15.7. Humanely handle, restrain and move animals.

5.15.9. Identify and describe the impacts of animal welfare and handling on meat quality and food safety.

5.15.11. Identify methods to minimize animal stress and safety (physiology, psychological and nutritional).

5.15.12. Examine an animal to evaluate its general condition.

**Outcome 5.16. Biosecurity**

Connect the sources and causes of contamination and develop protocols to implement biosecurity procedures.

**Competencies**

5.16.2. Identify activities and biological agents that contribute to the risk of acquiring or preventing a specific disease.

5.16.4. Assess a facility's biosecurity, classify the level of risk and recommend improvements.

5.16.5. Implement biosecurity procedures to prevent cross-site contamination (e.g., proper use and disposal of personal protective equipment [PPE] from site to site, vehicle cleaning between farm and processing site).

5.16.7 Select bio-containment practices (e.g., quarantine, eradicate, showering into facilities) to manage pests and diseases.