Veterinary Science
Subject Code: 010930
Course & Unit Descriptions

Course Description:

This course introduces the learner to various aspects of the world of veterinary science. Learners will develop knowledge of veterinary pharmacology, radiology and imaging techniques, principles of surgery, safe laboratory skills, and the concepts of ethics and professionalism in the work place. Learners will develop skills in inquiry and statistical methods. Learners will describe the anatomy and physiological functions of animals with practical applications made to animals used in production, companionship, research and conservational practices. Learners will describe causes, symptoms, and treatment of common diseases with special emphasis on developing preventative health management plans and breeding programs. Learners will analyze the nutritional value of feed ingredients, their functions and metabolism for various classes of animals. Learners will utilize principles of technology to manage information systems, and research issues affecting the industry.

Unit: Introduction to Pre-Veterinary Science

The students will be introduced to research techniques and safety procedures including the behavior, handling, and restraint of animals.

Benchmark: 3.11 Research and Analysis
Level 2: Conduct a problem-based study applying scientific methodology and using descriptive statistics to communicate and support predictions and conclusions

Indicators
3.11.01 Identify research problems and structure a statistical experiment, simulation or study related to the problem
3.11.02 Create a hypothesis and set the probability of acceptance based on review of valid literature
3.11.03 Establish and implement procedures for systematic collection, organization, and use of data
3.11.04 Select and apply sampling methods that appropriately represent the population to be studied
3.11.05 Create, interpret and use tabular and graphical displays and descriptive statistics to describe data
3.11.06 Compute measures of central tendency and dispersion to interpret results and draw conclusions
3.11.07 Describe the relationships among variables using correlations and draw conclusions
3.11.08 Draw conclusions based on observations and/or data analysis and disseminate information to interested parties

Academic Standards
English: Formulate open-ended research questions suitable for inquiry and investigation and adjust questions as necessary while research is conducted. (Research A, 8-10; Research A, 11-12)
Math: Use algebraic representations, such as tables, graphs, expressions, functions and inequalities, to model and solve problem situations. (Algebra D, 8-10)
Science: Participate in and apply the processes of scientific investigation to create models and to design, conduct, evaluate and communicate the results of these investigations. (Scientific Inquiry A, 9-10)

Benchmark: 4.1 Safety Procedures
Level 2: Follow safety procedures in specific situations with specialized tools and equipment, evaluate situation and take corrective action

Indicators
4.1.01 Demonstrate knowledge of safety rules and regulations
4.1.02 Interpret safety signs and symbols
4.1.03 Model safe attitudes and behaviors (e.g., lifting, climbing)
4.1.04 Identify safety hazards and take corrective measures
4.1.05 Use safety equipment in accordance with established procedures
4.1.06 Follow established procedures for the administration of first aid and contact emergency medical personnel when necessary

Academic Standards
English: Demonstrate comprehension of print and electronic text by responding to questions (e.g., literal, inferential, evaluative and synthesizing). (Reading Process B, 8-10; Reading Process B, 11-12)

Unit: Anatomy & Physiology
In this unit, the learner will be able to differentiate the functions of body systems for animals.

Benchmark: 1.2 Body Systems
Level 2: Describe the interrelationship of the animal body systems

Indicators
1.2.01 Identify external anatomical parts and functions
1.2.03 Identify the anatomy and describe the physiology of the nervous systems
1.2.12 Identify the anatomy and describe the physiology of the lymphatic systems
1.2.13 Identify the anatomy and describe the physiology of the mammary systems
1.2.14 Compare and contrast variations of systems among species and their adaptive values

Academic Standards
English: Apply knowledge of roots, affixes and phrases to aid understanding of content area vocabulary. (Vocabulary D, 11-12)

Unit: Tissue Types and Functions
In this unit, the student will be able to identify Cell variation in tissue types in association with function and systems.

Benchmark: 1.2 Body Systems
Level 2: Describe the interrelationship of the animal body systems

Indicators
1.2.07 Identify the anatomy and describe the physiology of the integumentary systems (skin) and associated structures
1.2.12 Identify the anatomy and describe the physiology of the lymphatic systems
1.2.14 Compare and contrast variations of systems among species and their adaptive values

Academic Standards
English: Apply knowledge of roots, affixes and phrases to aid understanding of content area vocabulary. (Vocabulary D, 11-12)

Unit: Musculoskeletal System
Students will learn muscle and bone types associated with physiological requirements within the animal systems.

Benchmark: 1.2 Body Systems
Level 2: Describe the interrelationship of the animal body systems

Indicators
1.2.04 Identify the anatomy and describe the physiology of the skeletal systems
1.2.05 Identify the anatomy and describe the physiology of the musculature systems
1.2.14 Compare and contrast variations of systems among species and their adaptive values

Academic Standards
English: Apply knowledge of roots, affixes and phrases to aid understanding of content area vocabulary. (Vocabulary D, 11-12)

Unit: Circulatory System
Students will learn the physiological structures and functions of closed circulatory systems.

Benchmark: 1.2 Body Systems
Level: Describe the interrelationship of the animal body systems

Indicators
1.2.06 Identify the anatomy and describe the physiology of the circulatory systems
1.2.14 Compare and contrast variations of systems among species and their adaptive values

Academic Standards
English: Apply knowledge of roots, affixes and phrases to aid understanding of content area vocabulary. (Vocabulary D, 11-12)

Unit: Respiratory System
Students will learn the physiological structures and functions of the respiratory system.

Benchmark: 1.2 Body Systems
Level 2: Describe the interrelationship of the animal body systems

Indicators
1.2.08 Identify the anatomy and describe the physiology of the respiratory systems
1.2.14 Compare and contrast variations of systems among species and their adaptive values

Academic Standards
English: Apply knowledge of roots, affixes and phrases to aid understanding of content area vocabulary. (Vocabulary D, 11-12)

Unit: Renal System
Students will learn the physiological structures and functions of the renal system.

Benchmark: 1.2 Body Systems
Level 2: Describe the interrelationship of the animal body systems

Indicators
1.2.09 Identify the anatomy and describe the physiology of the urinary systems
1.2.11 Identify the anatomy and describe the physiology of the endocrine systems
1.2.14 Compare and contrast variations of systems among species and their adaptive values

Academic Standards
English: Apply knowledge of roots, affixes and phrases to aid understanding of content area vocabulary. (Vocabulary D, 11-12)

Unit: Digestive System
Students will learn the physiological structures and functions of the digestive system.

Benchmark: 1.2 Body Systems
Level 2: Describe the interrelationship of the animal body systems

Indicators
1.2.02 Identify the anatomy and describe the physiology of the digestive systems
1.2.14 Compare and contrast variations of systems among species and their adaptive values

Academic Standards
English: Apply knowledge of roots, affixes and phrases to aid understanding of content area vocabulary. (Vocabulary D, 11-12)

Unit: Reproductive System
Students will learn the physiological structures and functions of the reproductive system.

Benchmark: 1.2 Body Systems
Level 2: none selected

Indicators
1.2.01 Identify external anatomical parts and functions
1.2.10 Identify the anatomy and describe the physiology of the male and female reproductive systems
1.2.14 Compare and contrast variations of systems among species and their adaptive values

Academic Standards
English: Apply knowledge of roots, affixes and phrases to aid understanding of content area vocabulary. (Vocabulary D, 11-12)

Unit: Central Nervous System
Students will learn the physiological structures and functions of the nervous system.

Benchmark: 1.2 Body Systems
Level 2: Describe the interrelationship of the animal body systems

Indicators
1.2.03 Identify the anatomy and describe the physiology of the nervous systems
1.2.14 Compare and contrast variations of systems among species and their adaptive values

Academic Standards
English: Apply knowledge of roots, affixes and phrases to aid understanding of content area vocabulary. (Vocabulary D, 11-12)

Unit: Nutrition
In this unit the student will determine the nutritional requirements of animals and prepare and formulate balanced rations that satisfy those identified requirements.

Benchmark: 1.1 Nutrition
Level 2: Prepare/formulate and administer a ration and evaluate its effects on animals

Indicators
1.1.01 Identify types, composition, quality and compatibility of feeds, feed additives, and feed byproducts
1.1.02 Determine the role of nutrients and the nutritional requirements (matter and energy) for different life processes of the animal (e.g., maintenance/homeostasis, growth, reproduction, lactation)
1.1.03 Analyze nutritional content and quality of feeds (e.g., fiber, sodium, proteins, carbohydrates, lipids)
1.1.04 Identify and treat major nutrient deficiency and toxicity symptoms
1.1.05 Describe possible toxins, pathogens and contaminants found in feedstuffs (biological and nonbiological) and their impact on animals
1.1.06 Determine feed efficiency in relation to cost and availability of feeds
1.1.07 Formulate, prepare, and investigate rations and diets for production, specialty markets, and special diets (e.g., natural, organic, liver diet, heart diet, kidney diet)
1.1.08 Select and implement feeding and watering practices and systems for varying populations and purposes (e.g., reduce waste)
1.1.09 Evaluate/monitor performance of feeding systems and programs
1.1.10 Determine the ecological relationships between feed/agronomic production systems and feed quality

Academic Standards
English: Apply knowledge of roots, affixes and phrases to aid understanding of content area vocabulary. (Vocabulary D, 11-12)
Math: Write and solve real-world, multi-step problems involving money, elapsed time and temperature, and verify reasonableness of solutions. (Measurement F, 8-10)
Science: Describe the finite nature of Earth's resources and those human activities that can conserve or deplete Earth's resources. (Earth and Space Sciences D, 9-10)

Unit: Common Diseases & Disorders
In this unit, students will learn characteristics of common disease and disorders of selected species of animals. The students will be able identify basic categorical care methods.

Benchmark: 1.4 Animal Health
Level 2: Evaluate animal condition and implement treatment and maintenance options for species-specific diseases/disorders

Indicators
1.4.01 Evaluate general condition of animal using diagnostic methods (e.g., visual exam, physical exam, vital signs)
1.4.02 Describe diseases/disorders and their symptoms that are caused by microorganisms, parasites, genetic defects and environmental factors
1.4.03 Identify signs of pain, distress, disease and allergic reactions
1.4.07 Identify gastrointestinal ailments, neuromuscular disorders, respiratory diseases, blood disorders, and bone/joint problems
1.4.09 Identify types of immunity and immune responses and maintain animal health through immunization
1.4.11 Classify pharmaceutical drugs and describe general characteristics of each type
1.4.12 Describe the routes of administration for medications (e.g., intranasal, oral, IV, subQ, IM) and the process of drug absorption, distribution, metabolism, withdrawal and excretion
1.4.13 Calculate pharmaceutical dosages/mixtures, administer drug treatments and monitor potential problems associated with incorrect administration and common adverse effects

1.4.14 Recognize normal and abnormal dental structures and conditions, identify teeth and use dental terminology to accurately chart dental morphology
1.4.18 Explain zoonoses and communicable diseases common to humans and animals

Academic Standards

English: Apply knowledge of roots, affixes and phrases to aid understanding of content area vocabulary. (Vocabulary D, 11-12)

Math: Estimate, compute and solve problems involving real numbers, including ratio, proportion and percent, and explain solutions. (Number G, 8-10)

Science: Explain the characteristics of life as indicated by cellular processes and describe the process of cell division and development. (Life Sciences B, 9-10)

Unit: Principles of Surgery

The student will identify surgical instruments and apply aseptic techniques. Students will identify and practice surgical and medical nursing techniques that will enhance the quality and efficiency of surgical procedures.

Benchmark: 1.4 Animal Health

Level 2: Evaluate animal condition and implement treatment and maintenance options for species-specific diseases/disorders

Indicators

1.4.10 Administer care to animals in case of accident or illness
1.4.11 Classify pharmaceutical drugs and describe general characteristics of each type
1.4.12 Describe the routes of administration for medications (e.g., intranasal, oral, IV, subQ, IM) and the process of drug absorption, distribution, metabolism, withdrawal and excretion
1.4.13 Calculate pharmaceutical dosages/mixtures, administer drug treatments and monitor potential problems associated with incorrect administration and common adverse effects
1.4.15 Prepare a sterile surgical environment, prepare patients for surgery and conduct post-surgery procedures
1.4.16 Describe the indications, advantages, disadvantages, effects on the body and associated adverse side effects of commonly used preanesthetic and anesthetic agents
1.4.17 Practice techniques of anesthesia with both injectable and inhalant medications and monitor parameters during anesthesia

Academic Standards

English: Apply knowledge of roots, affixes and phrases to aid understanding of content area vocabulary. (Vocabulary D, 11-12)

Math: Estimate, compute and solve problems involving real numbers, including ratio, proportion and percent, and explain solutions. (Number G, 8-10)

Science: Explain the characteristics of life as indicated by cellular processes and describe the process of cell division and development. (Life Sciences B, 9-10)

Unit: Pharmacology

The student will have a basic knowledge of pharmaceutical drugs, including the calculation of dosages; an understanding of immunization; drug laws and regulations; and inventory control.

Benchmark: 1.4 Animal Health

Level 2: Evaluate animal condition and implement treatment and maintenance options for species-specific diseases/disorders

Indicators

1.4.09 Identify types of immunity and immune responses and maintain animal health through immunization
1.4.11 Classify pharmaceutical drugs and describe general characteristics of each type
1.4.12 Describe the routes of administration for medications (e.g., intranasal, oral, IV, subQ, IM) and the process of drug absorption, distribution, metabolism, withdrawal and excretion
1.4.13 Calculate pharmaceutical dosages/mixtures, administer drug treatments and monitor potential problems associated with incorrect administration and common adverse effects

Academic Standards

English: Apply knowledge of roots, affixes and phrases to aid understanding of content area vocabulary. (Vocabulary D, 11-12)
Math: Estimate, compute and solve problems involving real numbers, including ratio, proportion and percent, and explain solutions. (Number G, 8-10)
Science: Explain the characteristics of life as indicated by cellular processes and describe the process of cell division and development. (Life Sciences B, 9-10)

Unit: Radiology

The student will learn how to assist in the area of radiology and diagnostic ultrasound.

Benchmark: 1.4 Animal Health

Level 2: Evaluate animal condition and implement treatment and maintenance options for species-specific diseases/disorders

Indicators

1.4.05 Produce diagnostic radiographs using x-ray equipment and image receptors
1.4.06 Apply principles of image physics and perform ultrasonography techniques

Academic Standards

English: Apply knowledge of roots, affixes and phrases to aid understanding of content area vocabulary. (Vocabulary D, 11-12)
Math: Estimate, compute and solve problems involving real numbers, including ratio, proportion and percent, and explain solutions. (Number G, 8-10)
Science: Explain the characteristics of life as indicated by cellular processes and describe the process of cell division and development. (Life Sciences B, 9-10)

Unit: Genetics and Heredity

The student will be able to determine the principals of genetics. Students will be able to explain breeding systems, new technologies in animal reproduction and types of testing programs.

Benchmark: 2.3 Genetics

Level 2: Model the molecular basis of genetic transfer

Indicators

2.3.01 Predict and explain offspring genotypes and phenotypes using Mendel's Laws and Punnett Square
2.3.02 Explain alternative forms of transmission (e.g., Non-Mendelian inheritance)
2.3.03 Explain, model and predict the three dimensional shape, bonding patterns (covalent and hydrogen bonds) and antiparallel nature of deoxyribonucleic acid (DNA)
2.3.04 Model the Central Dogma Theory (e.g., replication, transcription, translation)
2.3.05 Describe the processes involved in gene regulation (e.g., histone acytelation, RNA stability, co-translational modifications and post-translational modifications)

2.3.06 Describe the properties and molecular structure of peptide/protein (i.e. primary, secondary, tertiary, quaternary)
2.3.07 Discuss alternative types of gene expression (e.g., sex-limited, sex-linked, partial dominance, epistatic, pleiotropic)

Academic Standards

English: Apply knowledge of roots, affixes and phrases to aid understanding of content area vocabulary. (Vocabulary D, 11-12)
Math: Construct convincing arguments based on analysis of data and interpretation of graphs. (Data Analysis F, 8-10)
Science: Explain the genetic mechanisms and molecular basis of inheritance. (Life Sciences C, 9-10)

Unit: Professional Career Opportunities

This unit is an overview of the profession. Students will discuss laws, ethics and present job-related opportunities, duties, salaries, and professional organizations.

Benchmark: 3.10 Business Regulation, Law and Related Issues

Level 2: Determine the impact of government regulations and societal issues on an environmental project or the performance of a business enterprise

Indicators

3.10.06 Identify governmental agencies and non-governmental organizations that impact agricultural/environmental issues
3.10.07 Research history, politics and policies related to issues
3.10.08 Assess the impact of issues affecting the industry and recommend solutions

Academic Standards

English: Demonstrate comprehension of print and electronic text by responding to questions (e.g., literal, inferential, evaluative and synthesizing). (Reading Process B, 8-10; Reading Process B, 11-12)
Math: Construct convincing arguments based on analysis of data and interpretation of graphs. (Data Analysis F, 8-10)
Social Studies: Evaluate the consequences of geographic and environmental changes resulting from governmental policies and human modifications to the physical environment. (Geography B, 11-12)

Unit: Veterinary Science Research Presentation

Students will create a problem-based study applying scientific methodology and drawing conclusions based on observations and/or data analysis and present findings.

Benchmark: 3.11 Research and Analysis

Level 2: Conduct a problem-based study applying scientific methodology and using descriptive statistics to communicate and support predictions and conclusions

Indicators

3.11.01 Identify research problems and structure a statistical experiment, simulation or study related to the problem
3.11.02 Create a hypothesis and set the probability of acceptance based on review of valid literature
3.11.03 Establish and implement procedures for systematic collection, organization, and use of data
3.11.04 Select and apply sampling methods that appropriately represent the population to be studied
3.11.05 Create, interpret and use tabular and graphical displays and descriptive statistics to describe data

3.11.06 Compute measures of central tendency and dispersion to interpret results and draw conclusions
3.11.07 Describe the relationships among variables using correlations and draw conclusions
3.11.08 Draw conclusions based on observations and/or data analysis and disseminate information to interested parties

Academic Standards

English: Formulate open-ended research questions suitable for inquiry and investigation and adjust questions as necessary while research is conducted. (Research A, 8-10; Research A, 11-12)

Math: Use algebraic representations, such as tables, graphs, expressions, functions and inequalities, to model and solve problem situations. (Algebra D, 8-10)

Science: Participate in and apply the processes of scientific investigation to create models and to design, conduct, evaluate and communicate the results of these investigations. (Scientific Inquiry A, 9-10)

Benchmark: 3.7 Communication Skills

Level 2: Conduct a business meeting using decision-making techniques

Indicators

3.7.01 Apply techniques to participate in/facilitate a group discussion
3.7.02 Apply active listening strategies
3.7.03 Develop and deliver formal and informal presentations
3.7.04 Articulate ideas and impact audience through verbal and nonverbal communication
3.7.07 Extract relevant, valid information from materials and cite sources of information
3.7.08 Develop reports and documents that organize information accurately and use formatting techniques for user friendliness

Academic Standards

English: Produce functional documents that report, organize and convey information and ideas accurately, foresee readers' problems or misunderstandings and that include formatting techniques that are user friendly. (Writing Applications C, 11-12)

Math: Use algebraic representations, such as tables, graphs, expressions, functions and inequalities, to model and solve problem situations. (Algebra D, 8-10)

Social Studies: Evaluate the reliability and credibility of sources. (Social Studies Skills and Methods A, 9 -10)

Unit: Agricultural Inter-Personal & Leadership Development

The student will identify and develop soft skills.

Benchmark: 3.8 Business Leadership

Level 2: Use multiple leadership concepts to change situations and enhance effectiveness in the change process

Indicators

3.8.01 Identify the purpose of leadership, the ethical dimensions of leadership and the relationship between leaders and team members
3.8.02 Identify leadership styles and traits of leaders
3.8.03 Identify the impact of individual differences and different situations on the practice of leadership
3.8.04 Assess strengths and weaknesses of leaders and team members and employ team-building techniques
3.8.05 Participate in and lead a small group with an interdependent task
3.8.06 Think critically and use problem-solving skills to analyze complex and diverse concepts
3.8.07 Use reasoning, judgment and imagination to create new possibilities in situations
3.8.08 Manage time with organizational tools and prioritize objectives, responsibilities and tasks

3.8.09 Apply conflict-resolution skills
3.8.10 Recognize/reward others for their efforts and contributions
3.8.11 Develop relationships with peer groups, support services, and professional organizations

Academic Standards

English: Use a variety of strategies to enhance listening comprehension. (Communication A, 8-10; Communication A, 11-12)

Math: Locate and interpret mathematical information accurately, and communicate ideas, processes and solutions in a complete and easily understood manner. (Mathematical Processes H, 8-10)

Social Studies: Critique data and information to determine the adequacy of support for conclusions. (Social Studies Skills and Methods B, 11-12)

Benchmark: 3.9 Emotional Intelligence

Level 2: Exhibit techniques to control emotional reactions to people and situations

Indicators

3.9.01 Conduct an interpersonal and intrapersonal inventory
3.9.02 Identify how individual actions impact others
3.9.03 Manage personal emotions, behavior and appearance to maintain professionalism
3.9.04 Describe and exhibit appropriate ethical behavior
3.9.05 Accept and use constructive feedback to improve work habits
3.9.06 Employ appropriate coping skills to prevent/handle workplace conflicts
3.9.07 Recognize, respect and utilize the diversity among people and cultures
3.9.08 Foster positive working relationships

Academic Standards

English: Use a variety of strategies to enhance listening comprehension. (Communication A, 8-10; Communication A, 11-12)

Social Studies: Analyze how issues may be viewed differently by various cultural groups. (People in Societies A, 11-12)