

PROGRAM CONCENTRATION: Agricultural Education
CAREER PATHWAY: Animal Science Pathway
COURSE TITLE: Equine Science

COURSE DESCRIPTION: This laboratory course is designed to introduce students to the scientific principles that underlie the breeding and husbandry of horses, the production, care, and management of horses.

- AG-ES-1. Students will be able to recognize the different breeds, types, and classes of horses as well as describing the evolution of the horse, its domestication and value in history.**
- Describe the characteristics of horses that allowed them to be domesticated.
 - Describe the various breeds of horses.
 - Describe how breeds of horses were developed.
 - Analyze the historical role of horses in the development of various societies.

Academic Standards:

- SB2. Students will analyze how biological traits are passed on to successive generations.*
- Examine the use of DNA technology in forensics, medicine, and agriculture.*
- SB4. Students will assess the dependence of all organisms on one another and the flow of energy and matter within their ecosystems.*
- Investigate the relationships among organisms, populations, communities, ecosystems, and biomes.*
 - Relate animal adaptations, including behaviors, to the ability to survive stressful environmental conditions.*
- SB5. Students will evaluate the role of natural selection in the development of the theory of evolution.*
- Explain the history of life in terms of biodiversity, ancestry, and the rates of evolution.*
 - Relate natural selection to changes in organisms.*
 - Recognize the role of evolution to biological resistance (pesticide and antibiotic resistance).*
- SZ1. Students will derive the phylogeny of animal taxa (monophyletic clades in a cladogram) using informative characteristics.*
- Place taxa in a phylogenetic (evolutionary) context and provide data to support hypotheses of relationships*
 - Construct a graphical representation of animal evolution (cladogram)*
 - Recognize characters that are shared and derived, uniting taxa*
 - Interpret graphical representations of animal evolution (cladograms)*

- AG-ES-2. Students will demonstrate a working knowledge of the anatomy of the horse and describe the mechanisms that allow a horse to move.**
- Compare different types of cells and relate their function with their characteristics.
 - Describe the functions of major organs and organs systems of the horse.
 - Evaluate the function of each of the three major leg muscles that control movement and evaluate the mechanisms of motion.

Academic Standards:

- SB1. Students will analyze the nature of the relationships between structures and functions in living cells.*
- Explain the role of cell organelles for both prokaryotic and eukaryotic cells, including the cell membrane, in maintaining homeostasis and cell reproduction.*
- SB3. Students will derive the relationship between single-celled and multi-celled organisms and the increasing complexity of systems.*
- Compare how structures and function vary between the six kingdoms (archaebacteria, eubacteria, protists, fungi, plants, and animals).*
- SZ2. Students will compare form and function relationships within animal groups (clades) and across key taxa.*
- Explain the similarities and differences among major body plans (e.g., asymmetry, radial and bilateral symmetry).*
 - Relate important structural changes to key functional transitions.*
 - Dissect representative taxa and describe their internal anatomy and the function of major organ systems and organs and relate to cell specializations.*
- HS-ATS-8. The student will analyze the anatomy, physiology and basic pathophysiology of each of the body's systems and apply knowledge in performance of evaluating, monitoring, and treatment of client(s) and/or simulations.*

- AG-ES-3. Students will assess common problems in the structure of a horse and how these problems can be solved.**
- Describe the problems that are caused by unsoundness and how to methodically examine a horse for these problems.
 - Name and describe unsound conditions of the legs or skeletal system.
 - Recognize problems that should be treated by a veterinarian and explain solutions for these problems.

Academic Standards:

SZ3. Students will compare form and function relationships within animal groups (clades) and across key taxa.

c. Relate important structural changes to key functional transitions.

HS-ATS-8. The student will analyze the anatomy, physiology and basic pathophysiology of each of the body's systems and apply knowledge in performance of evaluating, monitoring, and treatment of client(s) and/or simulations.

AG-ES-4. Students will be able to select horses based on their use.

- a. Discuss why conformation is more important than breed when selecting a horse.
- b. Explain the characteristics that make horses desirable for different uses, then identify these traits and typical markings for the face and legs of horses.

AG-ES-5. Students will be able to describe the process of gene transfer in horses, determine how the science of genetics is used, and discuss the reproductive process.

- a. Explain the differences between DNA and RNA, as well as between gene, allele, and chromosome.
- b. Distinguish between phenotypic and genotypic traits.
- c. Describe the relationship between dominant and recessive traits
- d. Identify genetic abnormalities in horses and its cause.
- e. Compare the role of different hormones in controlling the reproductive process in horses.
- f. Discuss different types of breeding programs.
- g. Explain the advantages of artificial insemination to breeding operations.
- h. Describe the process of embryo transfer to mares.

Academic Standards:

SB4. Students will analyze how biological traits are passed on to successive generations.

a. Distinguish between DNA and RNA.

b. Explain the role of DNA in storing and transmitting cellular information.

d. Describe the relationships between changes in DNA and potential appearance of new traits including

Alterations during replication.

- *Insertions*
- *Deletions*
- *Substitutions*
- *Mutagenic factors that can alter DNA.*
- *High energy radiation (x-rays and ultraviolet)*
- *Chemical*

- SB1. Students will analyze the nature of the relationships between structures and functions in living cells.*
- Explain the role of cell organelles for both prokaryotic and eukaryotic cells, including the cell membrane, in maintaining homeostasis and cell reproduction.*

- AG-ES-6. Students will be able to discuss the digestive system of the horse and explain nutritional needs.**
- Distinguish between simple stomach, ruminant, and the cecum digestive systems.
 - Describe the function of the small and large intestine and the roles of these parts in the digestive process.
 - Describe the symptoms of nutrient deficiencies.
 - Describe the function of nutrients within the body.
 - Develop a feeding program for horses.
 - Explain the requirements for feeding and watering horses.

Academic Standards:

- SB1. Students will analyze the nature of the relationships between structures and functions in living cells.*
- Identify the function of the four major macromolecules (i.e., carbohydrates, proteins, lipids, nucleic acids).*

- AG-ES - 7: Students will recognize the common diseases of the horse and prescribe preventive measures and management practices.**
- Describe signs of disease in horses.
 - Discuss how diseases are transmitted.
 - Describe ways in which disease can be prevented.
 - Plan a vaccination program for horses.

- AG-ES-8. Students will demonstrate an understanding of the parts of a horse's hoof and how to care for the foot.**
- Discuss the importance of healthy feet as it relates to the overall health of the horse.
 - Compare and contrast the three main functions of the hoof wall.
 - Explain the importance of daily foot inspection.
 - Relates feet problems with the horses overall health.
 - Describe the process of shoeing a horse.

- AG-ES-9. Students will be able to describe the housing, shelters, and facilities needed to care for horses.**
- Identify the space and housing requirements for a horse.
 - Describe the safety requirements for a horse facility.
 - Describe the reasons for building fences.
 - Outlines the proper procedure for building a horse fence.

Academic Standards:

MM3D3. Students will understand the differences between experimental and observational studies by posing questions and collecting, analyzing, and interpreting data.

MM3P1 Students will solve problems (using appropriate technology).

- b. Solve problems that arise in mathematics and in other contexts.*
- c. Apply and adapt a variety of appropriate strategies to solve problems.*

AG-ES-10. Students will be able to discuss the various types of behavior associated with horses.

- a. Compare and contrast the 10 different behavioral categories associated with horses.
- b. Describe the sense of the vision, touch, smell, and hearing of the horse.
- c. Discuss how natural behavior is used to train a horse.
- d. Describe the role of the sense of touch in training.
- e. Outline a proper exercise program for horses.

AG-ES-11. The student demonstrates an understanding of career opportunities in livestock production and management.

- a. Explain the value of an Agricultural background for the individual entering a livestock-related occupation.
- b. Assess different employment opportunities that involve having a working knowledge of Animal Science.
- c. Explain the skills needed to obtain one of these careers.
- d. Demonstrate how to prepare a resume that effectively summarizes and highlights these skills.

Academic Standards:

ELA10RC4 The student establishes a context for information acquired by reading across subject areas.

- a. Explores life experiences related to subject area content.*
- b. Discusses in both writing and speaking how certain words and concepts relate to multiple subjects.*

AG-ES-13. The student demonstrates an understanding of ethics in livestock and how livestock production effects the environment.

- a. Describe livestock production problems relating to the environment.
- b. Describe the role of livestock in conjunction with food supply and food-animal regulations.

Academic Standards:

ELA10LSV1. The student participates in student-to-teacher, student-to-students, and group verbal interactions. The student

- c. Responds to questions with appropriate information.*
- d. Actively solicits another person's comments or opinion.*
- e. Offers own opinion forcefully without domineering.*
- f. Contributes voluntarily and responds directly when solicited by teacher or discussion leader.*
- g. Gives reasons in support of opinions expressed.*
- i. Employs group decision-making techniques such as brainstorming or a problem-solving sequence (e.g., recognizes problem, defines problem, identifies possible solutions, selects optimal solution, implements solution, and evaluates solution).*

SEV1. Students will investigate the flow of energy and cycling of matter within an ecosystem and relate these phenomena to human society.

- b. Relate food production and quality of nutrition to population growth and the trophic levels.*

SEV4. Students will understand and describe availability, allocation and conservation of energy and other resources

- f. Describe the need for informed decision making of resource utilization (i.e. energy and water usage allocation, conservation, food and land, and long-term depletion).*

SEV5. Students will recognize that human beings are part of the global ecosystem and will evaluate the effects of human activities and technology on ecosystems.

- a. Describe factors affecting population growth of all organisms, including humans. Relate these to factors affecting growth rates and carrying capacity of the environment.*
- c. Explain how human activities affect global and local sustainability.*

AG-ES-14. The student becomes oriented to the comprehensive program of agricultural education, learns to work safely in the agriculture lab and work sites, demonstrates selected competencies in leadership through the FFA and agricultural industry organizations, and develops plans for a supervised agricultural experience program.

- a. Explains the role of the Agriculture Education program and the FFA in personal development.
- b. Demonstrates knowledge learned through a Supervised Agricultural Experience Program (SAEP).
- c. Develops leadership and personal development skills through participation in the FFA.
- d. Explores career opportunities in animal science through the FFA and Agriculture Education Program.

- e. Explores the professional agricultural organizations associated with the course content.

Academic Standards:

ELA10LSV1. The student participates in student-to-teacher, student-to-students, and group verbal interactions. The student

- d. Actively solicits another person's comments or opinion.*
- e. Offers own opinion forcefully without domineering.*
- f. Contributes voluntarily and responds directly when solicited by teacher or discussion leader.*
- g. Gives reasons in support of opinions expressed.*

**Co-Requisite – Characteristics of Science
Habits of Mind**

SCSh1. Students will evaluate the importance of curiosity, honesty, openness, and skepticism in science.

- a. Exhibit the above traits in their own scientific activities.
- b. Recognize that different explanations often can be given for the same evidence.
- c. Explain that further understanding of scientific problems relies on the design and execution of new experiments which may reinforce or weaken opposing explanations.

SCSh2. Students will use standard safety practices for all classroom laboratory and field investigations.

- a. Follow correct procedures for use of scientific apparatus.
- b. Demonstrate appropriate technique in all laboratory situations.
- c. Follow correct protocol for identifying and reporting safety problems and violations.

SCSh3. Students will identify and investigate problems scientifically.

- a. Suggest reasonable hypotheses for identified problems.
- b. Develop procedures for solving scientific problems.
- c. Collect, organize and record appropriate data.
- e. Develop reasonable conclusions based on data collected.
- f. Evaluate whether conclusions are reasonable by reviewing the process and checking against other available information.

SCSh4. Students use tools and instruments for observing, measuring, and manipulating scientific equipment and materials.

- a. Develop and use systematic procedures for recording and organizing information.
- b. Use technology to produce tables and graphs.
- c. Use technology to develop, test, and revise experimental or mathematical models.

SCSh5. Students will demonstrate the computation and estimation skills necessary for analyzing data and developing reasonable scientific explanations.

- a. Trace the source on any large disparity between estimated and calculated answers to problems.
- b. Consider possible effects of measurement errors on calculations.
- c. Recognize the relationship between accuracy and precision.
- d. Express appropriate numbers of significant figures for calculated data, using scientific notation where appropriate.
- e. Solve scientific problems by substituting quantitative values, using dimensional analysis and/or simple algebraic formulas as appropriate.

SCSh6. Students will communicate scientific investigations and information clearly.

- a. Write clear, coherent laboratory reports related to scientific investigations.
- b. Write clear, coherent accounts of current scientific issues, including possible alternative interpretations of the data.
- c. Use data as evidence to support scientific arguments and claims in written or oral presentations.
- d. Participate in group discussions of scientific investigation and current scientific issues.

The Nature of Science

SCSh7. Students analyze how scientific knowledge is developed.

Students recognize that:

- a. The universe is a vast single system in which the basic principles are the same everywhere.
- b. Universal principles are discovered through observation and experimental verification.
- c. From time to time, major shifts occur in the scientific view of how the world works.
- d. More often, however, the changes that take place in the body of scientific knowledge are small modifications of prior knowledge. Major shifts in scientific views typically occur after the observation of a new phenomenon or an insightful interpretation of existing data by an individual or research group.
- e. Hypotheses often cause scientists to develop new experiments that produce additional data.
- f. Testing, revising, and occasionally rejecting new and old theories never ends.

SCSh8. Students will understand important features of the process of scientific inquiry.

Students will apply the following to inquiry learning practices:

- a. Scientific investigators control the conditions of their experiments in order to produce valuable data.
- b. Scientific researchers are expected to critically assess the quality of data including possible sources of bias in their investigations' hypotheses, observations, data analyses, and interpretations.

- c. Scientists use practices such as peer review and publication to reinforce the integrity of scientific activity and reporting.
- d. The merit of a new theory is judged by how well scientific data are explained by the new theory.
- e. The ultimate goal of science is to develop an understanding of the natural universe which is free of biases.
- f. Science disciplines and traditions differ from one another in what is studied, techniques used, and outcomes sought.

Reading Across the Curriculum

Reading Standard Comment

After the elementary years, students engage in reading for learning. This process sweeps across all disciplinary domains, extending even to the area of personal they experience text in all genres and modes of discourse. In the study of various disciplines of learning (language arts, mathematics, science, social studies), students must learn through reading the communities of discourse of each of those disciplines. Each subject has its own specific vocabulary, and for students to excel in all subjects, they must learn the specific vocabulary of those subject areas in context.

Beginning with the middle grades years, students begin to self-select reading materials based on personal interests established through classroom learning. Students become curious about science, mathematics, history, and literature as they form contexts for those subjects related to their personal and classroom experiences. As students explore academic areas through reading, they develop favorite subjects and become confident in their verbal discourse about those subjects.

Reading across curriculum content develops both academic and personal interests in students. As students read, they develop both content and contextual vocabulary. They also build good habits for reading, researching, and learning. The Reading Across the Curriculum standard focuses on the academic and personal skills students acquire as they read in all areas of learning.

Students will enhance reading in all curriculum areas by:

- a. Reading in all curriculum areas
 - Read a minimum of 25 grade-level appropriate books per year from a variety of subject disciplines and participate in discussions related to curricular learning in all areas.
 - Read both informational and fictional texts in a variety of genres and modes of discourse.
 - Read technical texts related to various subject areas.
- b. Discussing books
 - Discuss messages and themes from books in all subject areas.
 - Respond to a variety of texts in multiple modes of discourse.
 - Relate messages and themes from one subject area to messages and themes in another area.

- Evaluate the merit of texts in every subject discipline.
 - Examine author’s purpose in writing.
 - Recognize the features of disciplinary texts.
- c. Building vocabulary knowledge
- Demonstrate an understanding of contextual vocabulary in various subjects.
 - Use content vocabulary in writing and speaking.
 - Explore understanding of new words found in subject area texts.
- d. Establishing context
- Explore life experiences related to subject area content.
 - Discuss in both writing and speaking how certain words are subject area related.
 - Determine strategies for finding content and contextual meaning for unknown words.

CTAE Foundation Skills

The Foundation Skills for Career, Technical and Agricultural Education (CTAE) are critical competencies that students pursuing any career pathway should exhibit to be successful. As core standards for all career pathways in all program concentrations, these skills link career, technical and agricultural education to the state’s academic performance standards.

The CTAE Foundation Skills are aligned to the foundation of the U. S. Department of Education’s 16 Career Clusters. Endorsed by the National Career Technical Education Foundation (NCTEF) and the National Association of State Directors of Career Technical Education Consortium (NASDCTEc), the foundation skills were developed from an analysis of all pathways in the sixteen occupational areas. These standards were identified and validated by a national advisory group of employers, secondary and postsecondary educators, labor associations, and other stakeholders. The Knowledge and Skills provide learners a broad foundation for managing lifelong learning and career transitions in a rapidly changing economy.

CTAE-FS-1 Technical Skills: Learners achieve technical content skills necessary to pursue the full range of careers for all pathways in the program concentration.

CTAE-FS-2 Academic Foundations: Learners achieve state academic standards at or above grade level.

CTAE-FS-3 Communications: Learners use various communication skills in expressing and interpreting information.

CTAE-FS-4 Problem Solving and Critical Thinking: Learners define and solve problems, and use problem-solving and improvement methods and tools.

CTAE-FS-5 Information Technology Applications: Learners use multiple information technology devices to access, organize, process, transmit, and communicate information.

CTAE-FS-6 Systems: Learners understand a variety of organizational structures and functions.

CTAE-FS-7 Safety, Health and Environment: Learners employ safety, health and environmental management systems in corporations and comprehend their importance to organizational performance and regulatory compliance.

CTAE-FS-8 Leadership and Teamwork: Learners apply leadership and teamwork skills in collaborating with others to accomplish organizational goals and objectives.

CTAE-FS-9 Ethics and Legal Responsibilities: Learners commit to work ethics, behavior, and legal responsibilities in the workplace.

CTAE-FS-10 Career Development: Learners plan and manage academic-career plans and employment relations.

CTAE-FS-11 Entrepreneurship: Learners demonstrate understanding of concepts, processes, and behaviors associated with successful entrepreneurial performance.