

EQUINE BIOLOGY AND EVOLUTION CURRICULUM



Grade Level(s): 11/12

Curriculum Author(s): Marisa Bedron

Course Description:

This course provides an in-depth exploration of equine biology, tracing the evolutionary origins of horses and examining their complex biological systems. Designed for students with interests in veterinary medicine, equine science, or zoology, this course blends theoretical knowledge with practical insights into equine anatomy, physiology, and reproductive biology. The course will cover concepts such as evolutionary biology, systemic systems including the muscular, circulatory, and nervous systems, accessory systems including the respiratory, integumentary, endocrine system, and reproduction covering hormonal cycles, mating behaviors, and the gestation process. Throughout the course, students will engage with a variety of learning modalities, including lectures, laboratory dissections, industry professional guest speakers, and field trips to equine facilities. Upon completion, students will have a robust understanding of the biological foundations that underpin equine health and management. This knowledge will prepare them for advanced studies in equine sciences or careers in the equine industry, where a deep understanding of horse biology and evolution is essential. Students enrolled in this course and its pair (Comprehensive Care and Management of Equine Animals) are eligible for University of Connecticut Early College Experience (ECE) credit. Every student must maintain and document an approved supervised agriculture experience (SAE) project and actively participate in the Woodbury FFA Chapter to develop premier leadership, personal growth, and career success through attending FFA meetings and participating in chapter events and planning.

Year At A Glance

Unit Title	Overarching Essential Question	Overarching Enduring Understanding	<u>Vision of A Learner “I Can” Statements</u>
Tracing Hoofprints: The Evolutionary Journey of Equines	How have the evolutionary adaptations of horses shaped their physical characteristics, behavior, and ecological roles over time?	The evolutionary history of horses illustrates how species adapt to their environments through changes in physical traits and behaviors, demonstrating the broader principles of natural selection and adaptation in the context of ecological and environmental pressures.	TCC2, TCC3, TI3, AA1, AA4, CCE1, CCE3, DE1, P4
Equine Systemic Anatomy	How do the interconnected systems within a horse's body work together to maintain health, performance, and adaptability?	The health and performance of horses depend on the complex interplay between their systemic bodily systems, with each system contributing to the overall functionality and adaptability of the organism. Understanding these interactions is essential for optimizing care, performance, and well-being in equine management.	TCC2, TI4, CCE1, CCE2, CCE4, DE1



<u>Equine Accessory Systems: Supporting Structures And Functions</u>	<p>How do the accessory systems of horses—such as the integumentary, endocrine, and sensory systems—support their overall health, behavior, and adaptation to their environment?</p>	<p>The accessory systems of horses, including the integumentary, endocrine, and sensory systems, play crucial roles in maintaining overall health and facilitating interactions with their environment, illustrating how specialized systems contribute to the adaptability and well-being of the organism.</p>	<p>TCC3, TI1, TI3, AA2, CCE1, CCE4, DE2, P1, P4</p>
<u>Equine Reproduction: Fundamentals And Advanced Techniques</u>	<p>The equine reproductive system is a complex interplay of anatomical and physiological processes that ensures species survival through successful mating, gestation, and foaling. Understanding these processes is essential for effective breeding practices and the health of both mares and stallions.</p>	<p>The equine reproductive system is a finely tuned network of physiological processes that work together to ensure successful reproduction. Knowledge of these processes is vital for managing breeding, optimizing fertility, and ensuring the health and well-being of both mares and stallions.</p>	<p>TCC1, TCC3, TI1, AA2, AA4, CCE4, DE4, P4</p>

UNIT 1 | TRACING HOOFPRIENTS: THE EVOLUTIONARY JOURNEY OF EQUINES

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

Connecticut Agriculture, Food and Natural Resource Framework

AS.01.01.01.a Summarize the origin, significance, distribution, and domestication of different animal species.

AS.01.01.01.b Examine the characteristics of animals that developed in response to the environmental and production related influences.

AS.01.01.01.c Evaluate the implication of animal characteristics on production practices and the environment.

AS.01.01.02.a Summarize the major components of animal industrial systems (e.g., livestock, small animal, research).

AS.01.01.02.b Analyze the development of a variety of animal industries, technological advancements, research, and engineering practices and how they influenced products, services, and careers.

Common Core State Standards

ELA-LITERACY.W.11-12.2 Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.

ELA-LITERACY.W.11-12.9 Draw evidence from literary or informational texts to support analysis, reflection, and research.

Vision of A Learner Attributes: Students will be able to independently use their learning to...

TCC: THINK CRITICALLY AND CREATIVELY

TCC2 I can evaluate evidence from multiple perspectives, and recognize their limitations and implications in order to justify new conclusions.

TCC3 I can integrate relevant information to produce multiple valid solutions.

TI: TAKE INITIATIVE

TI3 I can formulate and investigate probing questions to further my learning.

AA: ADAPT AND ADJUST

AA1 I can evaluate different approaches and justify the best pathway to success.

AA4 I can create opportunities to extend my learning by remaining open-minded in any situation.

CCE: COLLABORATE AND COMMUNICATE EFFECTIVELY

CCE1 I can initiate discussions with my peers and teachers about a variety of topics, respecting differing viewpoints, actively listening to others, and responding thoughtfully with peer-reviewed evidence that is free of bias.

CCE3 I can show initiative in prompting group discourse and fostering collaboration among others, providing actionable feedback, and working with others to solve problems and/or design products.

DE: DEMONSTRATE EMPATHY

DE1 I can acknowledge, process, and respond appropriately to others' comments and perspectives.

P: PERSEVERE

P4 I can take on challenges and continuously engage in my own long-term strategies to overcome them to demonstrate through personal experience that failures are more instructive than discouraging.

Understandings: Students will understand that...

- The evolutionary adaptations of equine help explain the physiological and behavioral traits, highlighting how horses have evolved to meet environmental changes over millions of years.
- Equines have a rich phylogenetic history that illustrates the complexity of evolutionary processes, including speciation, adaptation, and extinction.
- The domestication of horses has significantly influenced their evolution, morphology, and genetics, shaping the modern breeds we see today.
- Studying equine evolution provides insights into biodiversity and the importance of conservation efforts to preserve genetic diversity and protect endangered equine species.

Essential Questions:

- How have equines evolved over millions of years, and what major adaptations have they developed?
- What factors have driven the evolutionary changes observed in equines?
- How has the process of domestication affected the physical and behavioral traits of modern horses?
- What can the study of equine evolution tell us about broader ecological and evolutionary theories?
- Why is it important to conserve equine species and their habits, and what strategies can be employed to achieve this?

Students will know...

- Key milestones in the evolution of equines from ancient ancestors to present-day species.
- Specific adaptations such as hoof development, dental changes, and digestive system modifications that have enabled equines to survive and thrive.
- How domestication has led to genetic bottlenecks, breed formation, and changes in physical appearance and temperament.
- A survey of current equine species, including both domesticated breeds and wild equids, and their status in the wild.
- The conservation status of various equine species and the ecological roles they play in their respective environment.

Students will be able to...

- Examine and interpret fossil records to understand historical equine forms and their environments.
- Apply evolutionary theories to explain the changes observed in the equine lineage.
- Identify specific anatomical and physiological adaptations in equines and relate these to environmental pressures.
- Assess the conservation needs of modern equine species and propose strategies to address these needs.
- Effectively communicate the results of their studies through presentations, reports, and discussions, using appropriate scientific terminology.

Key Vocabulary:

adaptation, biodiversity, cladistics, domestication, ecological niche, endangered species, eocene epoch, evolution, fossil record, genetic diversity, herbivore, hoofed mammals (ungulates), hyracotherium (eohippus), miocene epoch, morphology, paleontology, phylogeny, pleistocene epoch, quaternary extinction event, speciation

Assessment Evidence

Performance Tasks:

Classwork: Analyze fossil data of early equines to understand their morphological changes over time such as hoof structure, dental patterns, and size. **TI3, TCC2, DE1**

Interim: Create a detailed timeline that maps the evolutionary progression of equines from Hyracotherium to modern horses including evolutionary milestones, geological epochs, and significant environmental changes that influenced equine evolution. **P4, CCE3**

Classwork: Select a significant adaptation in equines, such as hoof development or grazing-related dental changes, to conduct a case study exploration of how this adaptation facilitated speciation and survival. **TCC3**

Other Evidence:

Classwork: Participate in a structured debate regarding the impact of human activities on the evolution of modern horses discussing the effects of domestication, selective breeding and habitat modification. **CCE1, AA1, AA4**

Summative: Written summative (test) assessment.

Classwork: Identify a currently endangered equine species and develop a comprehensive conservation strategy to address genetic diversity, habitat preservation, and potential threats. **TI3**

Learning Plan

- Students will review fossil data of early equines comparing and contrasting anatomical and physiological evolution markers. **TI3, TCC2, DE1**
- Students will create a timeline showcasing the evolutionary progression of equines. **P4, CCE3**
- Students will discuss the evolution of adaptations specific to equine animals that have developed their current and historical uses. **TI3**

Teacher Resources:

Teacher Created Resources

UNIT 2 | EQUINE SYSTEMIC ANATOMY

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

Connecticut Agriculture, Food and Natural Resource Framework

Connecticut Agriculture, Food and Natural Resource Framework

AS.01.01.01.b Examine characteristics of animals that developed in response to environmental and production related influences.

AS.06.01.01.b Classify animals using a taxonomic classification system.

AS.06.01.03.c Communicate knowledge of animal systems with proper classification terms to others in an effective and accurate manner.

AS.06.02.03.a Identify the properties, locations, functions and types of animal cells, tissues, organs and body systems.

AS.06.02.03.b Compare and contrast animal cells, tissues, organs, body systems types, and functions among animal species.

AS.06.02.03.c Apply knowledge of anatomical and physiological characteristics of animals to make production and management decisions.

AS.06.03.01.a Identify optimal anatomical and physiological characteristics according to established breed standards.

AS.06.03.01.b Compare and contrast desirable anatomical and physiological characteristics of animals within and between species.

AS.06.03.01.c Select animals to maximize performance based on anatomical and physiological characteristics that affect health, growth and reproduction.

Common Core State Standards

ELA-LITERACY.L.11-12.6 Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.

ELA-LITERACY.W.11-12.2 Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.

ELA-LITERACY.W.11-12.9 Draw evidence from literary or informational texts to support analysis, reflection, and research.

ELA-LITERACY.RH.11-12.7 Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, as well as in words) in order to address a question or solve a problem.

Vision of A Learner Attributes: Students will be able to independently use their learning to...

TCC: THINK CRITICALLY AND CREATIVELY

TCC2 I can evaluate evidence from multiple perspectives, and recognize their limitations and implications in order to justify new conclusions.

TI: TAKE INITIATIVE

TI4 I can apply my strengths and anticipate challenges to reach my current and future goals.

CCE: COLLABORATE AND COMMUNICATE EFFECTIVELY

CCE1 I can initiate discussions with my peers and teachers about a variety of topics, respecting differing viewpoints, actively listening to others, and responding thoughtfully with peer-reviewed evidence that is free of bias.

CCE2 I can assess my past successes and mistakes to change my approach.

CCE4 I can create opportunities to extend my learning by remaining open-minded in any situation.

DE: DEMONSTRATE EMPATHY

DE1 I can acknowledge, process, and respond appropriately to others' comments and perspectives.

Understandings: Students will understand that...

- Understanding the equine systemic anatomy is crucial for recognizing how interconnected systems support overall health, function, and performance in horses.
- Each systemic system has specific functions that are essential for the horse's survival, and disruptions in any system can significantly impact health and performance.
- A thorough understanding of systemic anatomy provides the foundation for effective equine care, management, and treatment, enabling handlers and caregivers to make informed health decisions.
- Equine systemic systems have evolved specific adaptations that enable horses to meet the demands of various performance and work-related activities.

Essential Questions:

- How do the major systemic systems in horses function and interact with each other?
- What are the common health issues that can arise in each of the equine systemic systems, and how can they be prevented or managed?
- How do anatomical and physiological features of these systems support a horse's ability to perform specific tasks?
- In what ways can knowledge of systemic anatomy improve our practices in equine health management and emergency response?

Students will know...

- The major systemic systems such as the cardiovascular, respiratory, and nervous systems, including their major components and functions.
- How to recognize healthy vs. abnormal function within these systems including signs and symptoms of distress or disease.
- Preventative measures and routine care practices that support the health of these systems.
- How various types of exercise and workload affect these systems and the physiological changes that occur as a result.
- Common diagnostic tools and methods used to assess the health of these systems, such as blood tests, imaging, and physical exams.

Students will be able to...

- Identify and describe the components of each major systemic system and their functions.
- Perform basic assessments to determine the health of these systems, such as checking pulse, respiratory rate, and gut sounds.
- Implement and advise on routine care practices that help maintain the health of these systems.
- Recognize early signs of system dysfunction and respond appropriately, including knowing when to seek veterinary care.
- Effectively communicate their findings and concerns regarding systemic health to veterinarians and other equine professionals.

Key Vocabulary:

alveoli, bolus, cardiovascular system, circadian rhythms, digestive system, endocrine system, enzyme, homeostasis, hormone, integumentary system, ligament, lymphatic system, musculoskeletal system, nervous system, neurons, peristalsis, renal system, respiratory system, synapse, tendon

Assessment Evidence

Performance Tasks:

Classwork: Label detailed diagrams of the equine cardiovascular, respiratory, and nervous systems. **CCE4**

Interim: Analyze a series of case studies that describe various symptoms related to dysfunction in specific equine systems to diagnose potential issues and suggest appropriate management or treatment strategies. **CCE1, CCE4**

Classwork: Role-play an emergency situation involving a horse suffering from an acute health issue working together with other role-playing participants to assess the situation, decide on immediate actions, and plan long-term management to prevent recurrence. **CCE2, TI4**

Other Evidence:

Interim: Design an educational brochure for horse owners that outlines key practices for maintaining the health of each major system that includes tips on routine care, signs of potential health issues, and when to seek veterinary care. **CCE4, DE1, TCC2**

Summative: Written summative (test) assessment.

Learning Plan

- Students will review each of the systemic anatomy systems and organs: cardiovascular, respiratory and nervous. **CCE4**
- Students will label diagrams of systemic systems to identify major organs and interactions with other organ systems. **CCE4**
- Students will communicate with professionals to create routine and emergency procedures in equine medical emergencies. **CCE4, DE1, TCC2**

Teacher Resources:

Teacher Created Resources



UNIT 3 | EQUINE ACCESSORY SYSTEMS: SUPPORTING STRUCTURES AND FUNCTIONS

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

Connecticut Agriculture, Food and Natural Resource Framework

AS.01.01.01.b Examine characteristics of animals that developed in response to environmental and production related influences.

AS.06.01.01.b Classify animals using a taxonomic classification system.

AS.06.01.03.c Communicate knowledge of animal systems with proper classification terms to others in an effective and accurate manner.

AS.06.02.03.a Identify the properties, locations, functions and types of animal cells, tissues, organs and body systems.

AS.06.02.03.b Compare and contrast animal cells, tissues, organs, body systems types, and functions among animal species.

AS.06.02.03.c Apply knowledge of anatomical and physiological characteristics of animals to make production and management decisions.

AS.06.03.01.a Identify optimal anatomical and physiological characteristics according to established breed standards.

AS.06.03.01.b Compare and contrast desirable anatomical and physiological characteristics of animals within and between species.

AS.06.03.01.c Select animals to maximize performance based on anatomical and physiological characteristics that affect health, growth and reproduction.

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ELA-LITERACY.W.11-12.9 Draw evidence from literary or informational texts to support analysis, reflection, and research.

ELA-LITERACY.RH.11-12.7 Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, as well as in words) in order to address a question or solve a problem.

Vision of A Learner Attributes: Students will be able to independently use their learning to...

TCC: THINK CRITICALLY AND CREATIVELY

TCC3 I can integrate relevant information to produce multiple valid solutions.

TI: TAKE INITIATIVE

TI1 I can implement a realistic plan and adapt when necessary to achieve my goals.

TI3 I can formulate and investigate probing questions to further my learning.

AA: ADAPT AND ADJUST

<p>AA2 I can assess my past successes and mistakes to change my approach.</p> <p>CCE: COLLABORATE AND COMMUNICATE EFFECTIVELY</p> <p>CCE1 I can initiate discussions with my peers and teachers about a variety of topics, respecting differing viewpoints, actively listening to others, and responding thoughtfully with peer-reviewed evidence that is free of bias.</p> <p>CCE4 I can create opportunities to extend my learning by remaining open-minded in any situation.</p> <p>DE: DEMONSTRATE EMPATHY</p> <p>DE2 I can honor my own feelings and show empathy toward others through my actions.</p> <p>P: PERSEVERE</p> <p>P1 I can self-reflect and seek feedback to build upon my strengths, apply those strengths to overcome obstacles, and share my strategies with others.</p> <p>P4 I can take on challenges and continuously engage in my own long-term strategies to overcome them to demonstrate through personal experience that failures are more instructive than discouraging.</p>	
<p>Understandings: Students will understand that...</p> <ul style="list-style-type: none"> • Accessory systems in equines, such as the integumentary (skin), urinary, and endocrine systems, play critical roles in maintaining overall health, protecting against disease, and regulating body functions. • These systems do not operate in isolation but interact closely with primary systems to ensure the horse's body functions optimally under various conditions. • Understanding the structures and functions of accessory systems is essential for preventing and managing common equine diseases and conditions. • Effective management of these systems can enhance equine performance, longevity, and welfare. 	<p>Essential Questions:</p> <ul style="list-style-type: none"> • How do equine accessory systems support the overall health and functionality of the horse? • What are the key components of the integumentary, lymphatic, and endocrine systems in horses, and what roles do they play? • How can issues within these accessory systems manifest in overall horse health, and how can they be addressed? • What preventive measures can be implemented to maintain the health of these systems? • How do environmental and management practices impact these accessory systems?
<p>Students will know...</p> <ul style="list-style-type: none"> • The functions and importance of the integumentary, lymphatic, and endocrine systems in horses. • Major components of these systems, such as skin, hooves, glands, lymph nodes, and their specific functions. • Indicators of health or dysfunction within these systems, such as skin conditions, lymphatic drainage issues, or hormonal imbalances. • Common disorders affecting these systems, such as dermatitis, lymphangitis, and metabolic diseases like Cushing's syndrome. • Effective care and management strategies that support the 	<p>Students will be able to...</p> <ul style="list-style-type: none"> • Recognize and describe the key structures and functions of the integumentary, lymphatic, and endocrine systems. • Diagnose common problems related to these systems based on symptoms and provide recommendations for management or treatment. • Apply preventive care techniques to maintain the health of these systems and prevent common diseases. • Effectively communicate the care needs of these symptoms to owners and other equine professionals. • Assess and critique how different management practices affect

health of these systems, including nutritional considerations, grooming practices, and routine veterinary care.	the health and efficiency of equine accessory systems.
Key Vocabulary: adrenal glands, cushing's syndrome, dermatitis, dermis, endocrine system, epidermis, hoof abscess, hyperadrenocorticism, hypothyroidism, insulin resistance, integumentary system, laminitis, lymphangitis, lymphatic system, melanoma, metabolic syndrome, pituitary gland, sebaceous glands, sweat glands, thyroid gland	
Assessment Evidence	
Performance Tasks: <i>Classwork:</i> Create detailed diagrams to map out the structures and functions of the equine integumentary, lymphatic, and endocrine systems including annotations explaining the role each component plays in overall equine health and how these systems interact with other bodily systems. P1, P4 <i>Classwork:</i> Review case studies that describe various symptoms affecting one or more of the equine accessory systems to diagnose the likely disorder, justify their diagnosis with supporting evidence, and propose a management or treatment plan. CCE1, CCE4 <i>Classwork:</i> Evaluate skin quality and improvements that can be made to an equine animal's integumentary system to meet animal welfare standards. DE2, TI1	Other Evidence: <i>Interim:</i> Develop a comprehensive preventative health care plan focused specifically on maintaining the health of the integumentary, lymphatic, and endocrine systems to include routine care, monitoring strategies, and preventative treatments to mitigate the risk of common disorders. TI3, TCC3, AA2 <i>Summative:</i> Written summative (test) assessment.
Learning Plan	
<ul style="list-style-type: none"> Students will review each of the accessory anatomy systems and organs: integumentary, lymphatic and endocrine. P1, P4 Students will communicate with professionals to create routine and emergency procedures in equine medical emergencies. TI3, TCC3, AA2 	
Teacher Resources: Teacher Created Resources	

UNIT 4 | EQUINE REPRODUCTION: FUNDAMENTALS AND ADVANCED TECHNIQUES

Desired Results - Goals, Transfer, Meaning, Acquisition

Established Goals:

Connecticut Agriculture, Food and Natural Resource Framework

AS.04.01.01.a Identify the male and female reproductive organs of the major animal species.

AS.04.01.01.b Analyze the functions of major organs in the male and female reproductive systems.

AS.04.01.01.c Select breeding animals based on the health of the reproductive organs (e.g., reproductive soundness exams, etc.)

AS.04.01.02.a Identify how age, size, life cycle, maturity level, and health status affect the reproductive efficiency of male and female animals.

AS.04.01.2.b Describe factors that lead to reproductive maturity.

AS.04.01.02.c Evaluate animals for reproductive readiness.

AS.04.01.03.a Summarize the importance of efficient and economic reproduction in animals.

AS.04.01.03.b Evaluate reproductive disorders that occur in animals.

AS.04.01.03.c Defend decisions to treat or cull animals with reproductive problems with both welfare and economic factors.

AS.04.02.01.a Summarize genetic inheritance in animals.

AS.04.02.01.b Analyze how genetics can optimize economic, ecological, health and welfare outcomes.

AS.04.02.01.c Evaluate breeding systems based on the principles of genetics.

AS.04.02.02.a Define inheritance and terms related to inheritance in animal breeding (e.g., dominant, codominant, recessive, homozygous, heterozygous, etc.)

AS.04.02.02.b Demonstrate how to determine the probability of one or more traits.

AS.04.02.02.c Justify the selection of breeding pairs to achieve a desired outcome.

AS.04.02.04.a Summarize different needs of breeding animals based on reproductive stage (e.g., newborn, parturition, gestation, gestation lengths, etc.)

AS.04.02.04.b Analyze the care needs for breeding stock in each stage of reproduction.

AS.04.03.01.a Identify natural and artificial breeding methods (e.g., natural breeding, artificial insemination, estrous synchronization, flushing, cloning, etc.)

AS.04.03.01.b Calculate the potential economic benefits of natural versus artificial breeding methods.

AS.04.03.01.c Select animal breeding methods based on reproductive and economic efficiency.

AS.04.03.02.a Describe the process and materials used in artificial insemination.

AS.04.03.02.b Demonstrate artificial insemination techniques.

AS.04.03.03.a Summarize the advantages and disadvantages of major reproductive management practices, including estrous synchronization, superovulations, flushing, and embryo transfer (e.g., cost, labor, equipment, etc.).

AS.04.03.04.a Describe the use of quantitative breeding values (e.g., EPDs, performance records, pedigrees) in the selection of genetically superior breedings stock.

AS.04.03.04.b Compare and contrast quantitative breeding value differences between genetically superior animals and animals of

average genetic value.

AS.04.03.04.c Evaluate animals for theoretical purchase based on Expected Progeny Difference, performance records, pedigrees, and specified production scenarios.

Common Core State Standards

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ELA-LITERACY.W.11-12.2 Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.

ELA-LITERACY.W.11-12.9 Draw evidence from literary or informational texts to support analysis, reflection, and research.

ELA-LITERACY.RH.11-12.7 Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, as well as in words) in order to address a question or solve a problem.

MATH. CONTENT.HSS.MD.A.3 Develop a probability distribution for a random variable defined for a sample space in which theoretical probabilities can be calculated; find the expected value.

MATH.CONTENT.HSN. Q.A.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.

Vision of A Learner Attributes: Students will be able to independently use their learning to...

TCC: THINK CRITICALLY AND CREATIVELY

TCC1 I can ask purposeful, insightful questions to find a variety of innovative solutions.

TCC3 I can integrate relevant information to produce multiple valid solutions.

TI: TAKE INITIATIVE

TI1 I can implement a realistic plan and adapt when necessary to achieve my goals.

AA: ADAPT AND ADJUST

AA2 I can assess my past successes and mistakes to change my approach.

AA4 I can create opportunities to extend my learning by remaining open-minded in any situation.

CCE: COLLABORATE AND COMMUNICATE EFFECTIVELY

CCE4 I can create opportunities to extend my learning by remaining open-minded in any situation.

DE: DEMONSTRATE EMPATHY

DE4 I can work respectfully with all members of my community and support the needs of others.

P: PERSEVERE

P4 I can take on challenges and continuously engage in my own long-term strategies to overcome them to demonstrate through personal experience that failures are more instructive than discouraging.

Understandings: Students will understand that...

- Understanding the reproductive anatomy and physiological process of equines is crucial for managing breeding effectively

Essential Questions:

- What are the key components of the equine reproductive system, and how do they function?

<p>and ethically.</p> <ul style="list-style-type: none"> • Effective breeding management involves timing, health considerations, genetic considerations, and ethical practices that ensure the welfare of both mare and stallion. • The genetics of breeding stock significantly impacts the traits and potential of offspring, influencing future generations of equines. • Modern reproductive technologies, such as artificial insemination and embryo transfer, play a vital role in equine breeding, offering solutions to breeding challenges and enhancing genetic diversity. 	<ul style="list-style-type: none"> • How can breeders effectively manage the breeding cycle of mares and stallions to optimize fertility and health? • What genetic factors must be considered when selecting equines for breeding? • How do modern technologies enhance or impact traditional breeding practices? • What ethical considerations arise in equine reproduction, and how can they be addressed?
<p>Students will know...</p> <ul style="list-style-type: none"> • The basic anatomy and physiology of equine reproductive systems, including hormonal cycles and their roles in reproduction. • Various breeding techniques, including natural cover, artificial insemination, and the use of reproductive technologies like embryo transfer. • How genetics influence traits in offspring and the importance of genetic screening and selection in breeding programs. • Strategies for managing the health of breeding animals, including nutritional needs, disease prevention, and care during pregnancy. • Ethical issues and legal considerations related to equine reproduction, including animal welfare and the use of biotechnologies. 	<p>Students will be able to...</p> <ul style="list-style-type: none"> • Conduct basic assessments of reproductive health and readiness in mares and stallions. • Develop and implement a breeding program considering genetic goals, animal health, and ethical standards. • Apply knowledge of reproductive technologies to enhance breeding outcomes. • Provide appropriate care and management for pregnant mares to ensure their health and the health of the foal. • Effectively communicate breeding plans, procedures, and outcomes to stakeholders, including horse owners, veterinarians, and peers.
<p>Key Vocabulary: artificial insemination (AI), biotechnology, breeding soundness examination, colostrum, conception, embryo transfer, estrous cycle, fertility, foal, genetic testing, gestation, libido, live cover, mare, neonate, parturition, stallion, superovulation, teasing, twinning</p>	
<p style="text-align: center;">Assessment Evidence</p>	
<p>Performance Tasks: <i>Interim:</i> Create a comprehensive breeding program for a hypothetical equine facility including selection of mares and stallions based on genetic profiles, breeding methods, timing of breeding to optimize fertility, and protocols for handling pregnant mares. TCC1, TCC3</p>	<p>Other Evidence: <i>Interim:</i> Engage in a structured debate on the use of advanced reproductive technologies in equine breeding, such as cloning, embryo transfer, and genetic modification. CCE1, AA1, AA4</p>

<p><i>Classwork:</i> Perform a simulated artificial insemination procedure using a model involving preparing the semen, handling and storing it correctly and using proper techniques for insemination. DE4, AA4, TI1</p> <p><i>Classwork:</i> Analyze a set of genetic testing results for a group of horses and interpret what the outcomes mean for a breeding program. AA1, P4</p> <p><i>Classwork:</i> Presented with a case study of a pregnant mare, create a plan of care throughout gestation, foaling and postpartum including nutritional planning, exercise regimes, preparation for foaling, and neonatal care for the foal. CCE4, TCC4</p>	<p><i>Summative:</i> Written summative (test) assessment.</p>
<p>Learning Plan</p>	
<ul style="list-style-type: none"> • Students will review the organs and functions of the equine reproductive system. CCE4 • Students will practice artificial insemination procedures for mares. DE4, AA4, TI1 • Students will analyze genetic data to make informed breeding decisions. CCE4, TCC4 	
<p>Teacher Resources: Teacher Created Resources</p>	