School District of Marshfield Course Syllabus

Course Name: ES Animal Science
Grade(s): 10-12
Length of Course: Semester
Credit: 1/2 Credit

Program Goal:

The School District of Marshfield Agriculture Education Program will provide learners the opportunity to explore and develop interests in various areas of agriculture while preparing young adults for their next steps in life. Whether it is pursuing a postsecondary education or entering the world of work, Marshfield's agriculture program offers diverse experiences for all students in agriculture, horticulture and natural resources. Marshfield's agriculture program will provide valuable learning experiences for all learners whether they want to learn more about the importance of agriculture on society, have a hobby related to agriculture or are preparing for an agriculture related career.

Course Description:

ES Animal Science is an equivalent science course that explores the anatomical features and functions of animals. Students will study careers with animals, feeding and nutrition, genetics, animal health, reproduction and animal rights/welfare. Learners have the opportunity to dissect a

fetal pig in order to understand mammalian internal anatomy and also perform animal biotechnology experiments.

Wisconsin Standards for Agriculture, Food and Natural Resources (AFNR)	
Animal Systems (AS)	
AS1: Students will examine the components, historical development, global implications and future trends of the animal systems industry.	
Evaluate the development and implications of animal origin, domestication and distribution. AS1.a	1.a.6.h: Outline the development of the animal industry and resulting products, services and careers. 1.a.8.h: Predict trends and implications of future development of the animal systems industry.
AS2: Students will classify, evaluate, select and manage animals based on anatomical and physiological characteristics.	
Classify animals according to hierarchical taxonomy and agricultural use. AS2.a	2.a.4.h: Explain how animals are classified using Linnaeus's taxonomical classification system. 2.a.5.h: Compare and contrast the hierarchical classification of the major agricultural animal species. 2.a.7.h: Appraise and evaluate the economic value of animals for various applications in the agriculture industry.
Apply principles of comparative anatomy and physiology to uses within various animal systems. AS2.b	2.b.6.h: Compare and contrast animal cells, tissues, organs and body systems and describe their functions. 2.b.8.h: Explain the relationship, importance and uses of animal tissues to growth, performance and health in the agriculture industry. 2.b.9.h: Compare and contrast organ types, functions and body systems adaptations among and between animal species. 2.b.10.h: Explain how the components and systems of anatomy and physiology relate to the production and use of animals. 2.b.12.h: Explain the impact of animal body systems on health, growth and reproduction.
AS3: Students will provide for the proper health care of animals.	
Prescribe and implement a prevention treatment program for animal diseases, parasites and other disorders. AS3.a	3.a.8.h: Perform simple health-check evaluations on animals. 3.a.9.h: Perform diagnostic tests to detect health problems in animals. 3.a.10.h: Diagnose illnesses and disorders of animals based on symptoms and problems caused by diseases, parasites and physiological disorders. 3.a.11.h: Treat common diseases, parasites and physiological disorders of animals. 3.a.12.h: Evaluate preventive measures for controlling and limiting the spread of diseases, parasites and disorders among animals.

	3.a.13.h: Design and implement a health maintenance and disease and disorder prevention plan for animals in their natural and/or confined environments. 3.a.14.h: Prepare animals, facilities and equipment for surgical and nonsurgical veterinary treatments and procedures. 3.a.15.h: Perform surgical and nonsurgical veterinary treatments and procedures in animal health care.
Identify bio-security threats and provide for the bio-security of agricultural animals and production facilities. AS3.b	3.b.4.h: Explain the health risk of zoonotic diseases to humans and their historical significance and future implications. 3.b.5.h: Implement zoonotic disease prevention methods and procedures for the safe handling and treatment of animals. 3.b.6.h: Discuss procedures at the local, state and national levels to ensure biosecurity of the animal industry.
AS4: Students will apply principles of animal nutrition to ensure the proper growth, development, reproduction and economic production of animals.	
Formulate feed rations to provide for the nutritional needs of animals. AS4.a	4.a.4.h: Determine the relative nutritional value of feedstuffs by evaluating their general quality and condition. 4.a.5.h: Appraise the adequacy of feed rations using data from the analysis of feedstuffs, animal requirements and performance. 4.a.6.h: Select appropriate feedstuffs for animals based on factors such as economics, digestive system and nutritional needs. 4.a.7.h: Formulate animal feeds based on nutritional requirements, using feed ingredients for maximum nutrition and optimal economic production.
AS5: Students will evaluate and select animals based on scientific principles of animal production.	
Evaluate the male and females reproductive systems in selecting animals. AS5.a	5.a.3.h: Describe the functions of major organs in the male and female reproductive systems. 5.a.4.h: Select breeding animals based on characteristics of the reproductive organs.
Evaluate animals for breeding readiness and soundness. AS5.b	5.b.2.h: Summarize factors that lead to reproductive maturity. 5.b.3.h: Evaluate and select animals for reproductive readiness.
Describe how selection and geographical regions impact the economic decisions of our livestock business. AS5.c	5.c.3.h: Evaluate reproductive problems that occur in animals.
Apply scientific principles in the selection and breeding of animals. AS5.d	5.d3.h: Explain the advantages of using genetically superior animals in the production of animals and animal products. 5.d.4.h: Select a breeding system based on the principles of genetics and reproductive/economic efficiencies.

Compare and contrast scientific methods associated with animal reproduction. AS5.f	5.f.6.h: Explain the processes of natural and artificial breeding methods. 5.f.9.h: Explain the processes of major reproductive management practices, including estrous synchronization, superovulation, flushing and embryo transfer. 5.f.10.h: Perform procedures for estrous synchronization, superovulation, flushing, embryo transfer and other reproductive management practices. 5.f.11.h: Explain and demonstrate the materials, methods and processes of artificial insemination.
AS6: Students will prepare and implement animal handling procedures for the safety of animals, producers and consumers of animal products.	
Formulate feed rations to provide for the nutritional needs of animals. AS6.a	6.a.4.h: Outline safety procedures for working with animals by species. 6.a.5.h: Design programs that assure the welfare of animals and prevent abuse or mistreatment. 6.a.6.h: Interpret animal behaviors and execute protocols for safe handling of animals. 6.a.7.h: Implement quality-assurance programs and procedures for animal production.
Formulate feed rations to provide for the nutritional needs of animals. AS6.b	6.b.4.h: Discuss consumer concerns with animal production practices relative to human health. 6.b.5.h: Explain why animal trace-back capability, using individual animal and farm identification systems, is important to producers and consumers.
AS7: Students will select animal facilities and equipment that provide for the safe and efficient production, housing and handling of animals.	
Design animal housing, equipment and handling facilities for the major systems of animal production. AS7.a	7.a.6.h: Explain how modern equipment and handling facilities enhance the safe and economic production of animals.
AS8: Students will analyze environmental factors associated with animal production.	
Outline methods of reducing the effects of animal agriculture on the environment. AS8.a	8.a.3.h: Outline methods of reducing the effects of animal agriculture on the environment.
Evaluate the effects of environmental conditions on animals. AS8.b	8.b.2.h: Describe the effects of environmental conditions on animal populations and performance.
Biotechnology Systems (BT)	
BT2: Students will demonstrate laboratory skills as applied to biotechnology.	
Perform microbiology, molecular biology, enzymology and immunology procedures. BT2.b	2.b.13.h: Explain the molecular basis for heredity and the tools and techniques used in DNA and RNA manipulations.

Environmental Service Systems (ESS)	
ESS3: Students will operate environmental service systems to manage a facility environment.	
Manage safe disposal of all categories of solid waste. ESS3.b	3.b.13.h: Evaluate and analyze environmental hazards created by different types of solid waste, solid waste accumulation and solid waste disposal.
Wisconsin Common Career Technical Standards (WCCTS)	
Creativity, Critical Thinking, Communication and Collaboration (4C)	
4C2: Students will formulate and defend judgments and decisions by employing critical thinking skills.	
Develop effective resolutions for a given problem, decision or opportunity using available information. 4C2.a	2.a.11.h: Determine the information needed to address an identified problem. 2.a.15.h: Determine the best resolution for a problem, decision or opportunity based on given criteria.
Develop and implement a resolution for a new situation using personal knowledge and experience. 4C2.b	2.b.5.h: Apply past experience to develop a course of action for a new situation. 2.b.6.h: Use existing knowledge to develop a resolution for a new situation, problem or opportunity.
4C3: Students will communicate and collaborate with others to accomplish tasks and develop solutions to problems and opportunities.	
Work collaboratively with others. 4C3.b	3.b.7.h: Participate in group processes to generate consensus. 3.b.8.h: Lead group processes to generate consensus. 3.b.9.h: Incorporate the use of technology to productively plan, implement and evaluate a solution, process or procedure.
Career Development (CD)	
CD1: Students will consider, analyze and apply an awareness of self, identity and culture to identify skills and talents.	
Identify person strengths, aptitudes and passions. CD1.a	1.a.3.h: Evaluate various occupations and career pathways to identify personal, academic and career goals based on personal strengths, aptitudes and passions.
CD2: Students will identify the connection between educational achievement and work opportunities in order to reach personal and career goals.	
Apply academic experiences to the world of work, inter-relationships and the community. CD2.a	2.a.3.h: Evaluate how performance and connections within the learning community enhance future opportunities. 2.a.4.h: Determine those opportunities that best support attainment of a specific career goal.
Assess attitudes and skills that contribute to successful learning in school and across the life span. CD2.b	2.b.7.h: Interpret and analyze the impact of current education, training and work trends on life, learning and career plans. 2.b.8.h: Assess education and training opportunities to acquire new skills necessary for career advancement. 2.b.9.h: Analyze local and regional labor market and job growth information to select a career pathway for potential advancement.

CD3: Students will create and manage a flexible and responsive individualized learning plan to meet their career goals.	
Investigate the world of work in order to gain knowledge of self in order to make informed career decisions. CD3.a	3.a.12.h: Evaluate changes in local, national and global employment trends, societal needs and economic conditions related to career planning.
Examine and evaluate opportunities that could enhance life and career plans and articulate plan to guide decisions and actions. CD3.b	3.b.5.h: Evaluate the relationship between educational achievement and career development.
CD4: Students will identify and apply employability skills.	
Develop positive relationships with others. CD4.d	4.d.5.h: Participate in cocurricular and community activities to enhance the school experience.
Global and Cultural Awareness (GCA)	
GCA1: Students will propose solutions and initiatives related to global issues.	
Explain how events in one part of the world affect nations, communities and individuals in other parts of the world. GCA1.b	1.b.7.h: Predict how a recent global event could affect community and self.
Information, Media and Technology Skills (IMT)	
IMT1: Students will access, interpret and evaluate information from a variety of sources in order to inform and support premises, arguments, decisions, ideas and initiatives.	
Apply data and information to communicate ideas and create new opportunities. IMT1.d	1.d.7.h: Synthesize data and information from multiple sources to identify new trends.
IMT2: Students will apply information literacy skills to access and evaluate media to design and produce media products.	
Prepare media products in order to communicate a specific message. IMT2.b	2.b.4.h: Create media products to communicate a given message to different audiences.
Leadership (LE)	
LE1: Students will apply leadership skills in real-world, family, community and business and industry applications.	
Implement leadership skills to accomplish team goals and objectives. LE1.a	1.a.10.h: Exhibit skills such as compassion, service, listening, coaching, developing others, team development. 1.a.11.h: Demonstrate skills such as enthusiasm, creativity, conviction, mission, courage, concept, focus, principle-centered living and change when interacting with others in general.

	1.a.12.h: Exhibit skills such as innovation, intuition, adaptation, life-long learning and coach-ability to develop leadership potential over time. 1.a.14.h: Apply parliamentary procedure to an appropriate situation.
Employ teamwork skills to achieve collective goals and use team members/ talents effectively. LE1.b	1.b.7.h: Capitalize on team members' individual talents and skills in a project. 1.b.9.h: Evaluate and apply teamwork processes that provide team building, consensus, continuous improvement, respect for the opinions of others, cooperation, adaptability and conflict resolution. 1.b.10.h: Demonstrate the ability to negotiate and adapt effectively to changes in projects and work activities to meet timelines.
Identify the role of community service and service learning in family, community and business and industry. LE1.c	1.c.6.h: Assess the roles and responsibilities of citizenship and formulate an activity or event to showcase community service. 1.c.7.h: Plan a community service event, participate in the event and evaluate its impact.
Wisconsin Standards for Science (SCI)	
Crosscutting Concepts (CC)	
CC5: Students use science and engineering practices, disciplinary core ideas, and an understanding ***of energy and matter*** to make sense of phenomena and solve problems.	
Energy and Matter	CC5.h: Students understand that the total amount of energy and matter in closed systems is conserved. They describe changes of energy and matter in a system in terms of energy and matter flows into, out of, and within that system. They also learn that energy cannot be created or destroyed. It only moves between one place and another place, between objects and/or fields, or between systems. Energy drives the cycling of matter within and between systems. In nuclear processes, atoms are not conserved, but the total number of protons plus neutrons is conserved.
Life Science (LS)	
LS1: Students use science and engineering practices, crosscutting concepts, and an understanding of ***structures and processes (on a scale from molecules to organisms)*** to make sense of phenomena and solve problems.	
Structure and Function LS1.A	LS1.A.h: Systems of specialized cells within organisms help perform essential functions of life. Any one system in an organism is made up of numerous parts. Feedback mechanisms maintain an organism's internal conditions within certain limits and mediate behaviors.
Organization for Matter and Energy Flow in Organisms LS1.C	LS1.C.h: The molecules produced through photosynthesis are used to make amino acids and other molecules that can be assembled into proteins or DNA. Through cellular respiration, matter and energy flow through different organizational levels of an organism as elements are recombined to form different products and transfer energy.

Information Processing LS1.D	LS1.D.h: Organisms can process and store a variety of information through specific chemicals and interconnected networks.
LS2: Students use science and engineering practices, crosscutting concepts, and an understanding of the ***interactions, energy, and dynamics within ecosystems*** to make sense of phenomena and solve problems.	
Cycles of Matter and Energy Transfer in Ecosystems LS2.B	LS2.B.h: Photosynthesis and cellular respiration provide most of the energy for life processes. Only a fraction of matter consumed at the lower level of a food web is transferred up, resulting in fewer organisms at higher levels. At each link in an ecosystem, elements are combined in different ways, and matter and energy are conserved. Photosynthesis and cellular respiration are key components of the global carbon cycle.
LS3: Students use science and engineering practices, crosscutting concepts, and an understanding of ***heredity*** to make sense of phenomena and solve problems.	
Inheritance of Traits LS3.A	LS3.A.h: DNA carries instructions for forming species' characteristics. Each cell in an organism has the same genetic content, but genes expressed by cells can differ.
Variation of Traits LS3.B	LS3.B.h: The variation and distribution of traits in a population depend on genetic and environmental factors. Genetic variation can result from mutations caused by environmental factors or errors in DNA replication, or from chromosomes swapping sections during meiosis.
Engineering, Technology, and the Application of Science (ETS)	
ETS2: Students use science and engineering practices, crosscutting concepts, and an understanding of the links among Engineering, Technology, Science, and Society to make sense of phenomena and solve problems.	
Influence of Engineering, Technology, and Science on Society and the Natural World. ETS2.B	ETS2.B.h: Modern civilization depends on major technological systems, such as agriculture, health, water, energy, transportation, manufacturing, construction, and communications. Engineers continuously modify these systems to increase benefits while decreasing costs and risks. New technologies can have deep impacts on society and the environment, including some that were not anticipated. Analysis of costs and benefits is a critical aspect of decisions about technology.

Key Vocabulary:			
abomasum	amino acid	balanced ration	Bos indicus
Bos taurus	carbohydrate	cervix	concentrate
corpus luteum	crossbreeding	dominant gene	embryo
estrogen	estrus	fertilization	genotype
gizzard	heterozygous	homozygous	hybrid vigor
pancreas	liver	small intestines	large intestines
ultrasounding	artery	vein	omasum
ovulation	parturition	phenotype	placenta
progesterone	reticulum	ruminant	testicles
testosterone	vagina	zoonoses	

Topics/Content Outline- Units and Themes:

Course Outline:

- The Animal Industry
  - Domestication and importance of livestock
  - Career opportunities in animal science
  - Safety in animal production
  - Animals and the environment
- Animal Health and Welfare
  - Animal rights/welfare
  - Diseases, vaccinations and treatments
- Feeding and Nutrition
  - Digestive anatomy
  - Feed nutrients
  - Feed additives and hormone implants
  - Evaluating and balancing rations
- Animal Breeding
  - Genetics
  - Animal reproduction
  - Biotechnology in livestock production
  - Animal breeding systems

Primary Resource(s):

Modern Livestock & Poultry Production, 9th Edition
Cengage Learning
ISBN: 978-113-3283-50-8