# Scope & Sequence

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| Course Name: Advanced Animal Science **TSDS PEIMS Code:** 13000700 | **Course Credit:** 1.0**Course Requirements:** Recommended for Grades 11-12. **Prerequisites:** Biology and Chemistry or Integrated Physics and Chemistry (IPC); Algebra l and Geometry; and either Small Animal Management, Equine Science, or Livestock Production.**Recommended Prerequisites:** Veterinary Medical Applications. |
| **Course Description:** Advanced Animal Science examines the interrelatedness of human, scientific, and technological dimensions of livestock production. Instruction is designed to allow for the application of scientific and technological aspects of animal science through field and laboratory experiences.  |
| **NOTE:** This is a suggested scope and sequence for the course content. This content will work with any textbook or instructional materials. If locally adapted, make sure all TEKS are covered. |
| **Total Number of Periods****Total Number of Minutes****Total Number of Hours** | 175 Periods7,875 Minutes131.25 Hours\* | \*Schedule calculations based on 175/180 calendar days. For 0.5 credit courses, schedule is calculated out of 88/90 days. Scope and sequence allows additional time for guest speakers, student presentations, field trips, remediation, extended learning activities, etc. |
| **Unit Number, Title, and Brief Description** | **# of Class Periods\***(assumes 45-minute periods)Total minutes per unit | **TEKS Covered****130.10. (c) Knowledge and skills** |
| **Unit 1: Professional Standards/Employability Skills**Students will begin the course by discussing professional standards and employability skills, including identifying career and entrepreneurship opportunities related to animal systems, applying competencies related to resources, information, interpersonal skills, and systems of operation in animal systems, and identifying employers’ expectations, including appropriate work habits, ethical conduct and legal responsibilities. Students will develop these skills and demonstrate these skills and attributes throughout the course. In small groups and/or in other classroom activities, students will demonstrate employers’ expectations and appropriate work habits, demonstrate characteristics of good citizenship such as stewardship, advocacy and community leadership. Students will use appropriate technology to research career topics.  | 5 periods225 minutes | (1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:(A) identify career development and entrepreneurship opportunities in the field of animal systems;(B) apply competencies related to resources, information, interpersonal skills, and systems of operation in animal systems;(C) demonstrate knowledge of personal and occupational safety and health practices in the workplace;(D) identify employers' expectations, including appropriate work habits, ethical conduct, and legal responsibilities; (E) demonstrate characteristics of good citizenship such as stewardship, advocacy, and community leadership; and(F) research career topics using technology such as the Internet. |
| **Unit 2: Field and Laboratory Investigations**Students will utilize 40% of instructional time to conduct field and laboratory investigations This field and laboratory investigations unit provides an enhancement opportunity for students to develop and demonstrate safe, environmentally appropriate, and ethical practices. Students will also demonstrate conservation of resources and proper disposal or recycling of materials. This is not a stand-alone unit. Classroom activities and allotted course time should be modified/adjusted to allow students sufficient time to master. Students will begin this course by discussing the expectations of this unit and needed documentation. In small groups and/or in other classroom activities, students will summarize field and laboratory investigations to ensure safe, environmentally appropriate, and ethical practices are being used. | Time has been incorporated within the other units. | (2) The student, for at least 40% of instructional time, conducts field and laboratory investigations using safe, environmentally appropriate, and ethical practices. The student is expected to:(A) demonstrate safe practices during laboratory and field investigations; and(B) demonstrate an understanding of the use and conservation of resources and the proper disposal or recycling of materials. |
| **Unit 3: Scientific Methods and Equipment**Students will use appropriate technology and/or assigned materials to learn scientific methods and equipment for laboratory and field investigations. Students will also learn the definition of science and the limitations, that hypotheses and tentative and testable statements, scientific theories are based on natural and physical phenomena and are capable of being tested, distinguish between scientific hypotheses and scientific theories, plan and implement descriptive, comparative, and experimental investigations, collect and organize qualitative and quantitative data and make measurements with accuracy and precision, analyze, evaluate, and make inferences, and predict trends from data. As a cumulating activity for this unit, students will prepare valid conclusions supported by the data through methods such as lab reports, labeled drawings, graphic organizers, journals, summaries, oral reports, and technology-based reports. | 20 periods900 minutes | (3) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:(A) know the definition of science and understand that it has limitations, as specified in subsection (b)(4) of this section;(B) know that hypotheses are tentative and testable statements that must be capable of being supported or not supported by observational evidence. Hypotheses of durable explanatory power that have been tested over a wide variety of conditions are incorporated into theories; (C) know that scientific theories are based on natural and physical phenomena and are capable of being tested by multiple independent researchers. Unlike hypotheses, scientific theories are well-established and highly-reliable explanations, but they may be subject to change as new areas of science are created and new technologies emerge;(D) distinguish between scientific hypotheses and scientific theories;(E) plan and implement descriptive, comparative, and experimental investigations, including asking questions, formulating testable hypotheses, and selecting equipment and technology;(F) collect and organize qualitative and quantitative data and make measurements with accuracy and precision using tools such as calculators, spreadsheet software, data-collecting probes, computers, standard laboratory glassware, microscopes, various prepared slides, stereoscopes, metric rulers, electronic balances, gel electrophoresis apparatuses, micropipettors, hand lenses, Celsius thermometers, hot plates, lab notebooks or journals, timing devices, cameras, Petri dishes, lab incubators, dissection equipment, meter sticks, and models, diagrams, or samples of biological specimens or structures;(G) analyze, evaluate, make inferences, and predict trends from data; and(H) communicate valid conclusions supported by the data through methods such as lab reports, labeled drawings, graphic organizers, journals, summaries, oral reports, and technology-based reports. |
| **Unit 4: Academic Skills** Students will employ critical thinking, scientific reason, and problem solving skills to make informed decision within and outside the classroom. In small groups and/or in other classroom activities, students will analyze, evaluate, and critique scientific explanations by using empirical evidence, logical reasoning, and experimental and observational testing, communicate and apply scientific information extracted from various sources, draw inferences based on data related to promotional materials for products and services, evaluate the impact of scientific research on society and the environment, and evaluate models according to their limitations in representing biological objects or events. As a culminating activity for this unit, students will research and describe the history of biology and contributions of scientists. | 15 of periods675 minutes | (4) The student uses critical thinking, scientific reasoning, and problem solving to make informed decisions within and outside the classroom. The student is expected to: (A) in all fields of science, analyze, evaluate, and critique scientific explanations by using empirical evidence, logical reasoning, and experimental and observational testing, including examining all sides of scientific evidence of those scientific explanations, so as to encourage critical thinking by the student;(B) communicate and apply scientific information extracted from various sources such as accredited scientific journals, institutions of higher learning, current events, news reports, and marketing materials;(C) draw inferences based on data related to promotional materials for products and services;(D) evaluate the impact of scientific research on society and the environment;(E) evaluate models according to their limitations in representing biological objects or events; and(F) research and describe the history of biology and contributions of scientists. |
| **Unit 5: Policies and Issues**Students will demonstrate an understanding of policies and issues in animal science. In small groups and/or other classroom activities, students will discuss the effects of biotechnology such as cloning, artificial insemination, and freezing of semen and embryos on the production of livestock, analyze the issues surrounding animal welfare and the humane treatment of livestock, apply principles of nutrition to maximize feed efficiency for livestock, and analyze the issues surrounding the impact of livestock production on the environment. As a culminating activity for this unit, students will design, conduct, and complete research to solve a self-identified problem in scientific animal agriculture. | 10 periods450 minutes | (13) The student demonstrates an understanding of policies and issues in animal science. The student is expected to:(A) discuss the effects of biotechnology such as cloning, artificial insemination, and freezing of semen and embryos on the production of livestock;(B) analyze the issues surrounding animal welfare and the humane treatment of livestock;(C) apply principles of nutrition to maximize feed efficiency for livestock;(D) design, conduct, and complete research to solve a self-identified problem in scientific animal agriculture; and(E) analyze the issues surrounding the impact of livestock production on the environment. |
| **Unit 6: Principles - Human, Scientific, and Technological Dimensions**Students will use appropriate technology and/or materials to learn and/or review principles related to the human, scientific, and technological dimensions of animal agriculture and the resources necessary for producing domesticated animals. Students will also learn how to evaluate market classes and grades of livestock, identify animal products such as organic and farm-raised and consumption patterns relative to human diet and health issues, and describe the growth and development of livestock as a global commodity. | 15 periods675 minutes | 6) The student demonstrates principles related to the human, scientific, and technological dimensions of animal agriculture and the resources necessary for producing domesticated animals. The student is expected to: (A) evaluate market classes and grades of livestock;(B) identify animal products such as organic and farm-raised and consumption patterns relative to human diet and health issues; and(C) describe the growth and development of livestock as a global commodity. |
| **Unit 7: Principles – Reproduction and Breeding**Students will use appropriate technology and/or materials to learn and/or review principles related to reproduction and breeding to livestock improvement. Students will also learn how to describe reproductive cycles and relate them to breeding systems, recognize the significance of meiosis to sexual reproduction, and explain the embryo transfer process and how it can impact livestock industries, evaluate animal behavior and its relationship to livestock management. | 15 periods675 minutes | (7) The student applies the principles of reproduction and breeding to livestock improvement. The student is expected to:(A) describe reproductive cycles and relate them to breeding systems;(B) explain the embryo transfer process and how it can impact livestock industries;(C) recognize the significance of meiosis to sexual reproduction; and(D) evaluate animal behavior and its relationship to livestock management. |
| **Unit 8: Principles – Molecular Genetics and Heredity**Students will use appropriate technology and/or materials to learn and/or review principles related to molecular genetics and heredity. Students will learn how to explain Mendel's laws of inheritance by predicting genotypes and phenotypes of offspring using the Punnett square, predict genotypes and phenotypes of animal offspring using Mendelian or non-Mendelian patterns of inheritance in various forms of livestock and use Punnett Square and assign alleles to justify all predictions, identify the parts of the nucleotide and the difference between the nucleotides found in deoxyribonucleic acid (DNA) versus ribonucleic acid (RNA), explain the functions of DNA and RNA, describe how heredity is used in the selection of livestock, and explain how traits are passed from parent to offspring. |  20 periods 900 minutes | (8) The student applies the principles of molecular genetics and heredity. The student is expected to:(A) explain Mendel's laws of inheritance by predicting genotypes and phenotypes of offspring using the Punnett square;(B) predict genotypes and phenotypes of animal offspring using Mendelian or non-Mendelian patterns of inheritance in various forms of livestock and use Punnett Square and assign alleles to justify all predictions; (C) identify the parts of the nucleotide and the difference between the nucleotides found in deoxyribonucleic acid (DNA) versus ribonucleic acid (RNA);(D) explain the functions of DNA and RNA;(E) describe how heredity is used in the selection of livestock such as knowing the difference between outbreeding and inbreeding/linebreeding; and(F) explain how traits are passed from parent to offspring through genetic transfer and the implications of breeding practices. |
| **Unit 9: Anatomy and Physiology**Students will use appropriate technology and/or assigned materials to examine and compare animal anatomy and physiology in livestock species. In small groups and/or other classroom activities, students will identify and compare the external anatomy of livestock species, compare the anatomy and physiology of the skeletal, muscular, reproductive, digestive, circulatory, genito-urinary, respiratory, nervous, immune, and endocrine systems of animals, describe interactions among various body systems such as circulatory, respiratory, and muscular systems, and identify and describe the functions of epithelial, nervous, connective, and muscular tissue. | 10 periods450 minutes | (9) The student examines and compares animal anatomy and physiology in livestock species. The student is expected to:(A) identify and compare the external anatomy of livestock species;(B) compare the anatomy and physiology of the skeletal, muscular, reproductive, digestive, circulatory, genito-urinary, respiratory, nervous, immune, and endocrine systems of animals;(C) describe interactions among various body systems such as circulatory, respiratory, and muscular systems; and(D) identify and describe the functions of epithelial, nervous, connective, and muscular tissue and relate the functions to animal body systems. |
| **Unit 10: Nutritional Requirements of Ruminant and Non-Ruminant**Students will use appropriate technology and/or assigned materials to determine the nutritional requirement of ruminant and non-ruminant animals. In small groups and/or other classroom activities, students will describe the structures and functions of the digestive system of ruminant animals, including cattle, and non-ruminant animals, including poultry, identify and describe sources of nutrients and classes of feeds and relate them to ruminant and non-ruminant animals, identify and describe vitamins, minerals, and feed additives and how they relate to the nutritional requirements of ruminant and non-ruminant animals, formulate rations based on different nutritional requirements, analyze feeding practices in relation to nutritional requirements of animals, and analyze feed quality issues and determine their effect on animal health. | 10 periods450 minutes | (10) The student determines nutritional requirements of ruminant and non-ruminant animals. The student is expected to:(A) describe the structures and functions of the digestive system of ruminant animals, including cattle, and non-ruminant animals, including poultry;(B) identify and describe sources of nutrients and classes of feeds and relate them to ruminant and non-ruminant animals;(C) identify and describe vitamins, minerals, and feed additives and how they relate to the nutritional requirements of ruminant and non-ruminant animals;(D) formulate rations based on different nutritional requirements;(E) analyze feeding practices in relation to nutritional requirements of animals; and(F) analyze feed quality issues and determine their effect on animal health. |
| **Unit 11: Animal Diseases and Parasites**Students will use appropriate technology and/or assigned materials to evaluate disease and parasites. In small groups and/or other classroom activities, students will identify factors that influence the health of animals such as geographic location, age, genetic composition, and inherited diseases for a particular species, identify pathogens and describe the effects that diseases have on various body systems, explain the methods of prevention, control, and treatment for diseases, describe the process of immunity and disease transmission, explain how external and internal parasites are transmitted and the effect they have on the host, explain the methods of prevention, control, and treatment of internal and external parasites, and describe the life cycles of various parasites and relate them to animal health issues. As a culminating activity for this unit, students will conduct parasite diagnostic tests. | 15 periods 675 minutes | (11) The student evaluates animal diseases and parasites. The student is expected to:(A) identify factors that influence the health of animals such as geographic location, age, genetic composition, and inherited diseases for a particular species;(B) identify pathogens and describe the effects that diseases have on various body systems;(C) explain the methods of prevention, control, and treatment for diseases;(D) describe the process of immunity and disease transmission;(E) explain how external and internal parasites are transmitted and the effect they have on the host;(F) explain the methods of prevention, control, and treatment of internal and external parasites;(G) describe the life cycles of various parasites and relate them to animal health issues; and(H) conduct parasite diagnostic tests. |
| **Unit 12: Growth of Organisms**Students will use appropriate technology and/or assigned materials to define how an organism grows and how specialized cells, tissues, and organs develop. In small groups and/or other classroom activities, students will compare cells from different parts of animals, including epithelia, muscles, and bones, to show specialization of structure and function, describe and explain cell differentiation in the development of organisms, and sequence the levels of organization in animals and relate the parts to each other and to the whole. | 10 periods450 minutes | (12) The student defines how an organism grows and how specialized cells, tissues, and organs develop. The student is expected to:(A) compare cells from different parts of animals, including epithelia, muscles, and bones, to show specialization of structure and function;(B) describe and explain cell differentiation in the development of organisms; and(C) sequence the levels of organization in animals and relate the parts to each other and to the whole. |
| **Unit 13: Livestock Harvesting Operations**Students will use appropriate technology and/or assigned materials to discuss livestock harvesting operations. In small groups and/or other classroom activities, students will map the stages of animal growth and development and how they relate to market readiness, describe the harvesting process, describe federal and state meat inspection standards such as safety, hygiene, and quality control standards, and identify retail and wholesale cuts of meat and meat by-products and correlate to major muscle groups. | 10 periods450 minutes | (14) The student discusses livestock harvesting operations. The student is expected to:(A) map the stages of animal growth and development and how they relate to market readiness;(B) describe the harvesting process;(C) describe federal and state meat inspection standards such as safety, hygiene, and quality control standards; and(D) identify retail and wholesale cuts of meat and meat by-products and correlate to major muscle groups. |
| **Unit 14: Marketing Livestock**Students will use appropriate technology and/or assigned materials to explore methods of marketing livestock. In small groups and/or other classroom activities, students will compare various methods of marketing livestock, and describe methods of marketing meat and meat products. | 10 periods450 minutes | (15) The student explores methods of marketing livestock. The student is expected to:(A) compare various methods of marketing livestock; and(B) describe methods of marketing meat and meat products. |
| **Unit 15: Supervised Agriculture Experience Program**Students will discuss and develop all components of a supervised agriculture experience. Through a variety of classroom activities, students will utilize appropriate technology to plan, propose, conduct, document and evaluate their supervised agriculture experience program, apply appropriate record-keeping skills, and participate in leadership opportunities. As a culminating activity for this unit, students will produce and participate in a local program of activities using a strategic planning process. |  10 periods450 minutes | (5) The student develops a supervised agriculture experience program. The student is expected to:(A) plan, propose, conduct, document, and evaluate a supervised agriculture experience program as an experiential learning activity;(B) apply proper record-keeping skills as they relate to the supervised agriculture experience;(C) participate in youth leadership opportunities to create a well-rounded experience program; and(D) produce and participate in a local program of activities using a strategic planning process.  |