Texas CTE

Advanced Animal Science (adopted 2024)

General requirements. This course is recommended for students in Grades 11 and 12. Prerequisites: Biology and Chemistry or Integrated Physics and Chemistry (IPC); Algebra I and Geometry; and either Small Animal Management, Equine Science, or Livestock and Poultry Production. Recommended prerequisite: Veterinary Science. Students must meet the 40% laboratory and fieldwork requirement. This course satisfies a high school science graduation requirement. Students shall be awarded one credit for successful completion of this course. AAS.A

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Introduction. AAS.B

1 Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions. AAS.B.1

2 The Agriculture, Food, and Natural Resources Career Cluster focuses on the production, processing, marketing, distribution, financing, and development of agricultural commodities and resources, including food, fiber, wood products, natural resources, horticulture, and other plant and animal products/resources. AAS.B.

3 **Advanced Animal Science examines the interrelatedness of human, scientific, and technological dimensions of animal production, including canine, feline, bovine, equine, caprine, porcine, ovine, poultry, and lagomorpha production. Instruction is designed to allow for the application of scientific and technological aspects of animal science through field and laboratory experiences. To prepare for careers in the field of animal science, students must attain academic knowledge and skills, acquire knowledge and skills related to animal systems, and develop knowledge and skills regarding career opportunities, entry requirements, and industry standards. To prepare for success, students need opportunities to learn, reinforce, apply, and transfer their knowledge and skills in a variety of settings.** AAS.B.3

4 **Nature of science. Science, as defined by the National Academy of Sciences, is the "use of evidence to construct testable explanations and predictions of natural phenomena, as well as the knowledge generated through this process." This vast body of changing and increasing knowledge is described by physical, mathematical, and conceptual models. Students should know that some questions are outside the realm of science because they deal with phenomena that are not scientifically testable.** AAS.B.4

5 **Scientific hypotheses and theories. Students are expected to know that:** AAS.B.5

A 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; and AAS.B.5A

B 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 and new technologies are developed. AAS.B.5B

6 **Scientific inquiry. Scientific inquiry is the planned and deliberate investigation of the natural world using scientific and engineering practices. Scientific methods of investigation are descriptive, comparative, or experimental. The method chosen should be appropriate to the question being asked. Student learning for different types of investigations include descriptive investigations, which involve collecting data and recording observations without making comparisons; comparative investigations, which involve collecting data with variables that are manipulated to compare results; and experimental investigations, which involve processes similar to comparative investigations but in which a control is identified.** AAS.B.6

A Scientific practices. Students should be able to ask questions, plan and conduct investigations to answer questions, and explain phenomena using appropriate tools and models. AAS.B.6A

B Engineering practices. Students should be able to identify problems and design solutions using appropriate tools and models. AAS.B.6B

7 **Science and social ethics. Scientific decision making is a way of answering questions about the natural world involving its own set of ethical standards about**

how the process of science should be carried out. Students should be able to distinguish between scientific decision-making methods (scientific methods) and ethical and social decisions that involve science (the application of scientific information). AAS.B.7

8 **Science consists of recurring themes and making connections between overarching concepts. Recurring themes include systems, models, and patterns. All systems have basic properties that can be described in space, time, energy, and matter. Change and constancy occur in systems as patterns and can be observed, measured, and modeled. These patterns help to make predictions that can be scientifically tested, while models allow for boundary specification and provide tools for understanding the ideas presented. Students should analyze a system in terms of its components and how these components relate to each other, to the whole, and to the external environment.** AAS.B.8

9 **Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.** AAS.B.9

10 **Statements that contain the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.** AAS.B.10

Knowledge and skills. AAS.C

1 **Scientific and engineering practices. The student, for at least 40% of instructional time, asks questions, identifies problems, and plans and safely conducts classroom, laboratory, and field investigations to answer questions, explain phenomena, or design solutions using appropriate tools and models. The student is expected to:** AAS.C.1

a ask questions and define problems based on observations or information from text, phenomena, models, or investigations; AAS.C.1.A

b apply scientific practices to plan and conduct descriptive, comparative, and experimental investigations and use engineering practices to design solutions to problems; AAS.C.1.B

c use appropriate safety equipment and practices during laboratory, classroom, and field investigations as outlined in Texas Education Agency-approved safety standards; AAS.C.1.C

d use appropriate tools such as dissection equipment, standard laboratory glassware, microscopes, various prepared slides, measuring devices, micropipettors, hand lenses, thermometers, hot plates, laboratory notebook, timing devices, cameras, Petri dishes, laboratory incubators, models, diagrams, and samples of biological specimens, syringes, needles, scalpels, microscopes slides, cover slips, artificial insemination equipment, and drench gun; AAS.C.1.D

e collect quantitative data using the International System of Units (SI) and qualitative data as evidence; AAS.C.1.E

f organize quantitative and qualitative data using calculators, computers, software, laboratory notebook, record keeping system, and reliable sources; AAS.C.1.F

g develop and use models to represent phenomena, systems, processes, or solutions to engineering problems; and AAS.C.1.G

h distinguish between scientific hypotheses, theories, and laws. AAS.C.1.H

2 **Scientific and engineering practices. The student analyzes and interprets data to derive meaning, identify features and patterns, and discover relationships or correlations to develop evidence-based arguments or evaluate designs. The student is expected to:** AAS.C.2

a identify advantages and limitations of models such as their size, scale, properties, and materials; AAS.C.2.A

b analyze data by identifying significant statistical features, patterns, sources of error, and limitations; AAS.C.2.B

c use mathematical calculations to assess quantitative relationships in data; and AAS.C.2.C

d evaluate experimental and engineering designs. AAS.C.2.D

3 **Scientific and engineering practices. The student develops evidence-based explanations and communicates findings, conclusions, and proposed solutions. The student is expected to:** AAS.C.3

a develop explanations and propose solutions supported by data and models and consistent with scientific ideas, principles, and theories; AAS.C.3.A

b communicate explanations and solutions individually and collaboratively in a variety of settings and formats; and AAS.C.3.B

c engage respectfully in scientific argumentation using applied scientific explanations and empirical evidence. AAS.C.3.C

g analyze, evaluate, make inferences, and predict trends from data; AAS.C.3.G

4 **Scientific and engineering practices. The student knows the contributions of scientists and recognizes the importance of scientific research and innovation on society. The student is expected to:** AAS.C.4

a analyze, evaluate, and critique scientific explanations and solutions by using empirical evidence, logical reasoning, and experimental and observational testing so as to encourage critical thinking by the student; AAS.C.4.A

b relate the impact of past and current research on scientific thought and society, including research methodology, cost-benefit analysis, and contributions of diverse scientists as related to the content; and AAS.C.4.B

c research and explore resources such as museums, libraries, professional organizations, private companies, online platforms, and mentors employed in a science, technology, engineering, and mathematics (STEM) field in order to investigate STEM careers. AAS.C.4.C

5 **The student develops a supervised agricultural experience program. The student is expected to:** AAS.C.5

a plan, propose, conduct, document, and evaluate a supervised agricultural experience program as an experiential learning activity; and AAS.C.5.A

b use appropriate record-keeping skills in a supervised agricultural experience program. AAS.C.5.B

6 The student develops leadership skills through participation in an agricultural youth organization. The student is expected to: AAS.C.6

a participate in youth agricultural leadership opportunities; AAS.C.6.A

b review and participate in a local program of activities; and AAS.C.6.B

c create or update documentation of relevant agricultural experience such as community service, professional, or classroom experiences. AAS.C.6.D

7 The student analyzes the history, domestication, and evaluation of animals, including canine, feline, bovine, equine, caprine, porcine, ovine, poultry, and lagomorphs. The student is expected to: AAS.C.7

a research and describe the history, including evolution, domestication, and introduction of species to countries, of canine, feline, bovine, equine, caprine, porcine, ovine, poultry, and lagomorphs; AAS.C.7.A

b analyze and describe how changes in the global food market impact the animal production industry; and AAS.C.7.B

c evaluate breeds of canine, feline, bovine, equine, caprine, porcine, ovine, poultry, and lagomorph based on purpose and conformation. AAS.C.7.C

8 The student defines how an organism grows and how specialized cells, tissues, and organs develop. The student is expected to: AAS.C.8

a compare cells to show specialization of structure and function; AAS.C.8.A

b explain cell division, including mitosis and meiosis; AAS.C.8.B

c explain cell differentiation in the development of tissues and organs; and AAS.C.8.C

d identify and explain the biological levels of organization in animals. AAS.C.8.D

9 The student examines and compares anatomy and physiology in animals. The student is expected to: AAS.C.9

a compare the external anatomy of canine, feline, bovine, equine, caprine, porcine, ovine, poultry, and lagomorphs; AAS.C.9.A

b identify the anatomical structures and physiological functions of the skeletal, muscular, circulatory, genitourinary, respiratory, nervous, immune, and endocrine systems of canine, feline, bovine, equine, caprine, porcine, ovine, poultry, and lagomorphs; and AAS.C.9.B

c investigate and describe the interrelationship among animal body systems. AAS.C.9.C

10 The student understands the anatomical structures and physiological functions of the digestive system to determine nutritional requirements of ruminant and

non-ruminant animals. The student is expected to: AAS.C.10

a describe the structures and functions of the digestive systems of canine, feline, bovine, equine, caprine, porcine, ovine, poultry, and lagomorphs; AAS.C.10.A

b identify and describe sources of nutrients and classes of feeds for canine, feline, bovine, equine, caprine, porcine, ovine, poultry, and lagomorphs; AAS.C.10.B

c identify and describe the feed additives and supplements used to meet the nutritional requirements of canine, feline, bovine, equine, caprine, porcine, ovine, poultry, and lagomorphs; AAS.C.10.C

d formulate rations based on different nutritional requirements, including age, gestation, lactation, sex, and purpose, for canine, feline, bovine, equine, caprine, porcine, ovine, poultry, and lagomorphs; AAS.C.10.D

e analyze feeding practices in relation to nutritional requirements, including age, gestation, lactation, sex, and purpose, for canine, feline, bovine, equine, caprine, porcine, ovine, poultry, and lagomorphs; AAS.C.10.E

f analyze feed quality issues and determine their effect on the health of canine, feline, bovine, equine, caprine, porcine, ovine, poultry, and lagomorphs; AAS.C.10.F

g research and compare the nutritional value of feeds for all species discussed; AAS.C.10.G

h identify forage plants used for livestock grazing and analyze the protein levels of each; and AAS.C.10.H

i research grazing practices such as rotational grazing and deferred grazing and explain the advantages and disadvantages of each using the scientific and engineering design process. AAS.C.10.I

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11 The student understands the principles of molecular genetics and heredity. The student is expected to: AAS.C.11

a explain Mendel's laws of inheritance and predict genotypes and phenotypes of offspring using a Punnett square; AAS.C.11.A

b use a Punnett square and assign alleles to justify genotype and phenotype predictions; AAS.C.11.B

c identify the parts of the nucleotide and differentiate between the nucleotides found in deoxyribonucleic acid (DNA) and ribonucleic acid (RNA); and AAS.C.11.C

d explain the functions of DNA and RNA. AAS.C.11.D

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12 The student applies the principles of reproduction and breeding to animal improvement. The student is expected to: AAS.C.12

a describe and compare reproductive anatomy of canine, feline, bovine, equine, caprine, porcine, ovine, poultry, and lagomorphs; AAS.C.12.A

b analyze and compare reproductive cycles and phases of canine, feline, bovine, equine, caprine, porcine, ovine, poultry, and lagomorphs; AAS.C.12.B

c correlate the reproductive cycles and phases to animal behavior; AAS.C.12.C

d research breeding systems, including grading up, crossbreeding, linebreeding, and inbreeding, and explain the advantages and disadvantages of each using the scientific and engineering design process; and AAS.C.12.D

e research breeding methods, including embryo transfer, artificial insemination, and natural mating, and explain the advantages and disadvantages of each using the scientific and engineering design process. AAS.C.12.E

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13 The student analyzes how diseases and parasites affect animal health. The student is expected to: AAS.C.13

a examine how factors such as geographic location, age, genetic composition, and inherited diseases influence the health of canine, feline, bovine, equine, caprine, porcine, ovine, poultry, and lagomorphs; AAS.C.13.A

b describe the process of immunity and disease transmission of canine, feline, bovine, equine, caprine, porcine, ovine, poultry, and lagomorphs; AAS.C.13.B

c identify and describe pathogens and the diseases they cause in canine, feline, bovine, equine, caprine, porcine, ovine, poultry, and lagomorphs; AAS.C.13.C

d describe the effects that diseases have on various body systems of canine, feline, bovine, equine, caprine, porcine, ovine, poultry, and lagomorphs; AAS.C.13.

e research and explain the methods of prevention and control for diseases of canine, feline, bovine, equine, caprine, porcine, ovine, poultry, and lagomorphs; AAS.C.13.E

f identify parasites of canine, feline, bovine, equine, caprine, porcine, ovine, poultry, and lagomorphs using common and scientific names; AAS.C.13.F

g describe the life cycles of various parasites and relate them to animal health issues; AAS.C.13.G

h explain how parasites are transmitted and the effect they have on canine, feline, bovine, equine, caprine, porcine, ovine, poultry, and lagomorphs; AAS.C.13.H

i conduct or simulate parasite diagnostic tests; and AAS.C.13.I

j explain the methods of prevention, control, and treatment of parasites of canine, feline, bovine, equine, caprine, porcine, ovine, poultry, and lagomorphs. AAS.C.13.J

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14 The student discusses livestock market readiness and harvesting methods. The student is expected to: AAS.C.14

a explain the stages of animal growth and development and how they relate to market readiness; AAS.C.14.A

b evaluate market class and grades of livestock; AAS.C.14.B

c compare harvesting methods for various species using the scientific and engineering design process; AAS.C.14.

d research and describe federal and state meat inspection standards such as safety, hygiene, and quality control standards; AAS.C.14.D

e identify wholesale and retail cuts of meat and correlate to major muscle groups; and AAS.C.14.E

f research animal by-products and explain their impact on society. AAS.C.14.F

15 The student explores methods of marketing animals and animal products. The student is expected to: AAS.C.15

a compare various methods of animal marketing such as auction, contract sales, private treaty, internet sales, value-based, and exhibition of various animals; AAS.C.15.A

b describe methods of marketing animal products such as farmers market, direct sales, wholesale, and retail; AAS.C.15.B

c research and evaluate the effectiveness of various strategies and campaigns to market animal products based on consumption patterns and consumer preferences; and AAS.C.15.C

d research and evaluate the effectiveness of various labeling options to market animal products such as organic, farm-raised, hormone-free, cage-free, grass-fed, antibiotic-free, and non-GMO labels based on consumption patterns and consumer preferences. AAS.C.15.D

16 The student demonstrates an understanding of policies and current issues in animal science. The student is expected to: AAS.C.16

a investigate and discuss the use of biotechnology and biosecurity in the animal science industry; AAS.C.16.A

b identify governmental regulations and policies such as environmental and animal welfare and research the impacts on animal production; and AAS.C.16.B

c identify and research a current issue in scientific animal agriculture and design a protocol to address the issue using the scientific and engineering design process. AAS.C.16.C