

ANIMAL SCIENCE

Animal Science is a two-semester program that provides students with an overview of the animal agriculture industry. Students participate in a large variety of activities and laboratory work including real and simulated animal science experiences and projects. All areas that the students study may be applied to both large and small animals. Topics to be covered in the course include: history and trends in animal agriculture, laws and practices relating to animal agriculture, comparative anatomy and physiology of animals, biosecurity threats and interventions relating to animal and human safety, nutrition, reproduction, careers, leadership, and supervised agriculture experiences relating to animal agriculture.

Animal Science introduces students to many careers in agriculture, and more specifically, animal science. These careers include but are not limited to: Animal Nutritionist, Animal Scientist, Embryo Technologist, Feedlot Specialist, Livestock Buyer, Livestock Geneticist, Livestock Producer, Meat Science Researcher, USDA Inspector, Veterinarian, and Veterinary Nurse.

Course Specifications

- DOE Code: 5008
- Recommended Grade Level: Grade 9-12
- Recommended Prerequisites: Introduction to Agriculture, Food and Natural Resources
- Credits: 1-3 credit(s) per semester, maximum of 6 credits
- Elective for all diplomas; Dual Credit with Ivy Tech Community College

Career and Technical Student Organizations

Career and Technical Student Organizations are considered a powerful instructional tool when integrated into Career and Technical Education courses. They enhance the knowledge and skills students learn in a course by allowing a student to participate a unique program of career and leadership development. Students in this course should be encouraged to participate in FFA.

Dual Credit

This course provides the opportunity for dual credit for students who meet postsecondary requirements for earning dual credit and successfully complete the dual credit requirements of this course.

Content Standards

Domain - Historic and Current Trends in the Animal Systems Industry

Core Standard 1 Students evaluate the implications of animal origin and analyze common animal production methods from both producer and global perspectives.

Standards

- AS-1.1** Evaluate and describe characteristics of animals that developed in response to the animal's environment and led to their domestication.

- AS-1.2** Describe the historical and scientific developments of different animal industries and summarize the products, services and careers associated with each.
- AS-1.3** Explain the role of animal agriculture within the food system in meeting food and nutritional security.
- AS-1.4** Analyze the impact of animal production methods on end product qualities (e.g., price, sustainability, marketing, labeling, animal welfare, etc.)
- AS-1.5** Calculate costs of marketing versus predicted increases in sales
- AS-1.6** Analyze and evaluate the accuracy and effectiveness of records used in an animal system business.
- AS-1.7** Analyze the structure of laws governing animal industries, international trade and animal production policies.
- AS-1.8** Analyze the local and global impact of sustainable animal agriculture practices on human and environmental systems.

Domain - Animal Husbandry and Welfare

Core Standard 2 Students demonstrate management techniques that ensure animal welfare and analyze procedures to ensure animal safety while maintaining safe animal products.

Standards

- AS-2.1** Design production plans that assure the welfare of animals and prevent abuse or mistreatment
- AS-2.2** Analyze and document animal welfare procedures used to ensure safety and maintain low stress when moving and restraining animals.
- AS-2.3** Analyze and document animal husbandry practices and their impact on animal welfare.
- AS-2.4** Utilize tools, technology and equipment to perform animal husbandry and welfare tasks.
- AS-2.5** Analyze consumer concerns with animal production practices relative to human health.
- AS-2.6** Analyze and summarize the impact of animal trace-back capabilities on producers and consumers.

Domain - Animal Nutrition

Core Standard 3 Students analyze the nutritional needs of animals and evaluate feed rations for effectiveness.

Standards

- AS-3.1** Differentiate between nutritional requirements of animals in different growth stages and production systems (e.g., growth, maintenance, gestation, natural, organic, etc.).
- AS-3.2** Correlate a species' nutritional needs to feedstuffs that could meet those needs.
- AS-3.3** Determine the relative nutritional value of feedstuffs by evaluating their general quality and condition.

- AS-3.4** Appraise the adequacy of feed rations using data from the analysis of feedstuffs, animal requirements and performance.
- AS-3.5** Compare and contrast methods that utilize feed additives and growth promotants with production practices that do not, (e.g., organic versus conventional production methods).
- AS-3.6** Utilize tools and equipment to perform animal nutrition tasks.
- AS-3.7** Analyze and apply information from a feed label and feeding directions to feed animals.
- AS-3.8** Analyze technologies used to provide animal nutrition and summarize their potential benefits and consequences.

Domain - Animal Reproduction

Core Standard 9 Students evaluate animals for reproduction readiness and soundness and apply scientific principles to breeding programs.

Standards

- AS-4.1** Analyze the functions of major organs in the male and female reproductive systems.
- AS-4.2** Assess and describe factors that lead to reproductive maturity.
- AS-4.3** Evaluate reproductive problems that occur in animals.
- AS-4.4** Compare and contrast the use of genetically superior animals in the production of animals and animal products.
- AS-4.5** Demonstrate how to determine probability trait inheritance in animals.
- AS-4.6** Analyze how DNA analysis can detect genetic defects in breeding stock
- AS- 4.7** Analyze the care needs for breeding stock in each stage of growth.
- AS-4.8** Calculate the potential economic benefits of natural versus artificial breeding methods.
- AS-4.9** Develop an understanding of artificial insemination, embryo transfer, and cloning.
- AS-4.10** Analyze the processes of major reproductive management practices, including estrous synchronization, superovulation, flushing and embryo transfer.
- AS-4.11** Compare and contrast quantitative breeding value differences between genetically superior animals and animals of average genetic value.

Domain - Environmental Considerations of Animals

Core Standard 5: Design animal housing, equipment and handling facilities for the major systems of animal production.

Standards

- AS-5.1** Critique designs for an animal facility and prescribe alternative layouts and adjustments for the safe, sustainable and efficient use of the facility.

AS-5.2 Analyze the use of modern equipment, technology and handling facility procedures and determine if they enhance the safe, economic and sustainable production of animals.

AS-5.3 Analyze animal facilities to determine if standards have been met.

AS-5.4 Analyze the structure of laws pertaining to animal systems.

Domain - Anatomy and Physiology

Core Standard 6 Classify animals according to taxonomic classification systems and use (e.g. agricultural, companion, etc.).

Standards

AS-6.1 Explain how animals are classified using a taxonomic classification system.

AS-6.2 Appraise and evaluate the economic value of animals for various applications in the agriculture industry.

AS-6.3 Analyze the visual characteristics of an animal or animal product and select correct classification terminology when referring to companion and production animals.

Core Standard 7: Apply principles of comparative anatomy and physiology to uses within various animal systems.

AS-7.1 Analyze the functions of each animal cell structure.

AS-7.2 Analyze the processes of meiosis and mitosis in animal growth, development, health and reproduction.

AS-7.3 Compare and contrast animal cells, tissues, organs, body systems types and functions among animal species.

Core Standard 8: Select and train animals for specific purposes and maximum performance based on anatomy and physiology.

AS-8.1 Compare and contrast desirable anatomical and physiological characteristics of animals within and between species.

AS-8.2 Compare and contrast procedures to sustainably and efficiently develop an animal to reach its highest performance potential with respect to its anatomical and physiological characteristics.

AS-8.3 Evaluate and select products from animals based on industry standards.

Domain - Animal Health and Safety

Core Standard 9: Students design programs to prevent animal diseases, parasites and other disorders and analyze biosecurity measures utilized to ensure animal welfare.

Standards

AS-9.1 Describe and demonstrate the proper use and function of specific tools and technology related to animal health management.

AS-9.2 Perform simple health-check evaluations on animals and practice basic emergency response procedures related to animals.

- AS-9.3** Identify and describe common illnesses and disorders of animals based on symptoms and problems caused by wounds, diseases, parasites and physiological disorders.
- AS-9.4** Research and analyze data to evaluate preventive measures for controlling and limiting the spread of diseases, parasites and disorders among animals.
- AS-9.5** Assess the safety and effectiveness of facilities and equipment used for surgical and nonsurgical veterinary treatments and procedures.
- AS-9.6** Analyze procedures at the local, state and national levels to ensure biosecurity of the animal industry.
- AS-9.7** Analyze the health risk of different zoonotic diseases to humans and identify prevention methods.

Domain - Environmental Impacts of Animal Agriculture

Core Standard 10: Students design and evaluate environments for animals to promote animal health and husbandry.

Standards

- AS-10.1** Assess the effectiveness of methods of reducing the effects of animal agriculture on the environment.
- AS-10.2** Critique the reliability and validity of evidence presented to support claims regarding the effects of environmental conditions on animal populations and performance (e.g., population changes, emerging species, extinction, etc.).
- AS-10.3** Implement and evaluate the effectiveness of methods to ensure optimal environmental conditions for animals.

Domain - Biotechnology in Animal Agriculture

Core Standard 11: Investigate and explain the roles and issues of biotechnology in animal agriculture.

- AS-11.1** Research and summarize the evolution of biotechnology in animal agriculture.
- AS-11.2** Assess and summarize current work in biotechnology being done to add value to animal agriculture and society.
- AS-11.3** Distinguish between current and emerging applications of biotechnology in agriculture.
- AS-11.4** Compare and contrast the benefits and risks of biotechnology compared with alternative approaches to improving agriculture.
- AS-11.5** Assess and summarize the role and scope of agencies that regulate biotechnology.
- AS-11.6** Research and summarize public perceptions of biotechnology in agriculture.
- AS-11.7** Assess and argue the pros and cons of transgenic species.
- AS-11.8** Research genetic engineering and CRISPR procedures used in production of animal species.
- AS-11.9** Assess the benefits, risks, and opportunities associated with using biotechnology to promote animal health.

Domain - Careers

Core Standard 12: Students examine the scope of career opportunities in and the importance of agriculture to the economy.

- AS-12.1** Evaluate the nature and scope of animal sciences in agriculture, society, and the economy
- AS-12.2** Describe career opportunities and means to achieve those opportunities in animal sciences
- AS-12.3** Identify how key organizational structures and processes affect organizational performance and the quality of products and services
- AS-12.4** Demonstrate those qualities, attributes and skills necessary to succeed in, or further prepare for, a chosen career while effectively contributing to society

Domain - Leadership

Core Standard 13: Students validate the necessity of leadership skills development in conjunction with participation in The National FFA Organization (FFA) as a critical component to a well-rounded agricultural education.

Standards

- AS-13.1** Communicate clearly, effectively, and with reason through speaking, writing, visuals, and active listening in formal and informal settings
- AS-13.2** Recognize and explain the role of the FFA in the development of leadership, education, employability, communications and human relations skills
- AS-13.3** Examine roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment
- AS-13.4** Acquire the skills necessary to positively influence others
- AS-13.5** Develop a skill set to enhance the positive evolution of the whole person

Domain - Supervised Agriculture Experience

Core Standard 14: Students validate the necessity of a Supervised Agricultural Experience (SAE) program as a critical component to a well-rounded agricultural education.

Standards

- AS-14.1** Explain the nature of and become familiar with those terms related to an SAE program
- AS-14.2** Explore the numerous possibilities for an SAE program which a student might develop
- AS-14.3** Develop an individual SAE program and implementation plan for record keeping skills