

ANIMAL SCIENCES (AN SCI)

AN SCI 1 – COOPERATIVE EDUCATION/CO-OP IN ANIMAL SCIENCES

1 credit.

Full-time off-campus work experience which combines classroom theory with practical knowledge of operations to provide a background upon which to base a professional career. Students receive credit only for the term in which they are actively enrolled and working. The same work experience may not count toward credit in another course.

Requisites: Consent of instructor

Repeatable for Credit: No

Last Taught: Spring 2019

AN SCI/DY SCI 101 – INTRODUCTION TO ANIMAL SCIENCES

3 credits.

An overview of animal sciences covering anatomy, physiology, nutrition, reproduction, genetics, management, animal welfare, and behavior of domesticated animals. Food animals are emphasized to discuss their contributions to humans.

Requisites: None

Course Designation: Breadth – Biological Sci. Counts toward the Natural Sci req

Level – Elementary

L&S Credit – Counts as Liberal Arts and Science credit in L&S

Repeatable for Credit: No

Last Taught: Summer 2025

Learning Outcomes: 1. Articulate a uniform background of animal agriculture including animal growth, nutrition, reproduction, behavior, and breeds to facilitate learning in subsequent animal science courses
Audience: Undergraduate

2. Accurately use terminology associated with animal agriculture including but not limited to animals, management practices, industry, and equipment
Audience: Undergraduate

3. Identify major animal groups and breeds in the topic areas of companion, service, draft, food, and biomedical, their uses, and their care
Audience: Undergraduate

4. Critically analyze past, current, and future controversial issues in animal agriculture and demonstrate capacity for ethical reasoning and action
Audience: Undergraduate

5. Situate common contemporary animal production systems within the context of economic, social, and environmental sustainability
Audience: Undergraduate

6. Characterize the impacts of animal agriculture at global, national, regional, and local levels
Audience: Undergraduate

AN SCI/DY SCI 102 – INTRODUCTION TO ANIMAL SCIENCES LABORATORY

1 credit.

Hands-on experience and demonstrations to develop practical skills with animals and to better understand the application of science to food production animals. It covers anatomy, physiology, nutrition, reproduction, genetics, management, animal welfare, and behavior of domesticated animals.

Requisites: DY SCI/AN SCI 101 or concurrent enrollment

Course Designation: Breadth – Biological Sci. Counts toward the Natural Sci req

Level – Elementary

L&S Credit – Counts as Liberal Arts and Science credit in L&S

Repeatable for Credit: No

Last Taught: Fall 2024

Learning Outcomes: 1. Recall and summarize fundamental concepts in animal growth, nutrition, reproduction, and behavior to facilitate learning in subsequent animal science courses
Audience: Undergraduate

Audience: Undergraduate

2. Accurately use terminology associated with animal agriculture including but not limited to animals, management practices, industry, and equipment
Audience: Undergraduate

3. Demonstrate proper handling, restraint, care, and management of food animals
Audience: Undergraduate

4. Identify anatomical parts of animal gastrointestinal and reproductive tracts, and explain the key functions of each part
Audience: Undergraduate

5. Classify common feedstuff and nutritional analysis used in the livestock industry
Audience: Undergraduate

6. Effectively engage in collaborative problem-solving and reflective practice
Audience: Undergraduate

7. Interpret and discuss scientific literature
Audience: Undergraduate

AN SCI 135 – GRAND CHALLENGES AND CAREER OPPORTUNITIES IN ANIMAL AND DAIRY SCIENCES

1 credit.

Covers the current key challenges and opportunities in the broad fields of animal agriculture, animal biology, animal health, and veterinary medicine, as well as internship and career opportunities and professional development activities that will maximize the value of an undergraduate career at UW-Madison and provide preparation for post-graduation endeavors.

Requisites: None

Course Designation: Level - Elementary

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Repeatable for Credit: No

Last Taught: Fall 2024

Learning Outcomes: 1. Explain the Grand Challenges in our broad field, including Animal Health and Welfare, Food Safety, Land and Water Stewardship, Precision Livestock Farming, and Biomedical Advancements
Audience: Undergraduate

2. Identify animal-related faculty and coursework, and create plans for courses and co-curricular opportunities that support your degree and future goals
Audience: Undergraduate

3. Describe common independent and experiential learning opportunities, including undergraduate research, internships, study abroad, international study tours, intercollegiate competitions, and related activities
Audience: Undergraduate

4. Identify internships, graduate and professional programs, and career opportunities in the public, private, and non-profit sectors related to animal agriculture, animal biology, animal health, veterinary medicine, and related fields
Audience: Undergraduate

5. Develop professional skills that will help undergraduate students succeed in future endeavors, including preparing a resume, writing a cover letter, building a professional network, finding an internship, having a successful interview, and maximizing the job or internship experience
Audience: Undergraduate

AN SCI 140 – INTRODUCTION TO POULTRY: FROM BACKYARD CHICKENS TO COMMERCIAL PRODUCTION

1 credit.

Overview of poultry science and production. Topics include anatomy and physiology, nutrition, health, reproduction, genetics, egg and meat quality, and management. Includes information on poultry flocks of various sizes and purposes, from hobby flocks to commercial production.

Requisites: None

Repeatable for Credit: No

Last Taught: Spring 2025

Learning Outcomes: 1. Describe common methods of poultry production and management.

Audience: Undergraduate

2. Explain basic biological aspects of poultry, including health, nutrition, and reproduction.
Audience: Undergraduate

3. Discuss the organization and structure of the poultry industry.
Audience: Undergraduate

4. Identify measures of quality in poultry and egg products.
Audience: Undergraduate

AN SCI 200 – THE BIOLOGY AND APPRECIATION OF COMPANION ANIMALS

3 credits.

A systematic coverage of many of the animals (including birds) that humans keep as their social companions. The classification, nutritional requirements, environmental considerations, reproductive habits, health, legal aspects and economics of companion animals and their supportive organizations.

Requisites: None

Course Designation: Breadth - Biological Sci. Counts toward the Natural Sci req

Level - Elementary

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Repeatable for Credit: No

Last Taught: Summer 2025

Learning Outcomes: 1. Recognize a broad range of types of companion animals and identify some unique characteristics of each

Audience: Undergraduate

2. Characterize the basic biology of most companion animals, including health, nutrition, reproduction, etc

Audience: Undergraduate

3. Summarize the basic requirements of care and husbandry for a variety of companion animals

Audience: Undergraduate

4. Identify differences in the biology and requirements of various types of companion animals.

Audience: Undergraduate

5. Identify current topics regarding companion animals.

Audience: Undergraduate

6. Characterize some ethical issues associated with animal ownership, care, and use.

Audience: Undergraduate

AN SCI 210 – YOU AND YOUR FOOD: FARM TO TABLE

2 credits.

Develop an understanding of the global food supply from farm to table by exploring ruminant animals, non-ruminant animals including insects, and selected agricultural materials. Topics such as the following will be discussed: land usage, environmental impacts from different feeding operations, utilization of food waste, and health risks associated with food consumption.

Requisites: None

Course Designation: Level - Elementary

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Repeatable for Credit: No

Last Taught: Spring 2025

Learning Outcomes: 1. Discuss topics related to agriculture and food manufacturing

Audience: Undergraduate

2. Identify unique aspects of ruminant animals that turn inedible plants and byproducts into human edible food with unique nutritional attributes

Audience: Undergraduate

3. Describe the role of side-stream utilization and circular economy of food production.

Audience: Undergraduate

4. Explain the role of alternative feedstuffs for animals in having a resilient food supply

Audience: Undergraduate

5. Describe how animal tissues are converted to protein-rich ingredients uniquely enriched in 'bioactive' molecules

Audience: Undergraduate

6. Describe how stabilization steps (a process or additive) convert protein-rich raw materials to food products, providing a diverse food supply

Audience: Undergraduate

7. Evaluate the tension between extending shelf life to limit food waste and health concerns from utilizing certain ingredients

Audience: Undergraduate

AN SCI 240 – ANCIENT ANIMALS AND PEOPLES

3 credits.

Provides an introduction to human and animal relationships from prehistory to the present. Examines how animals have influenced social and economic structures of past societies, with a focus on the advent of domestication. Explores the cultural and economic changes that domestication has had on human societies, as well as the behavioral, genetic, and morphological changes that this process had on once wild animals. Emphasizes the methods used to retrace human-animal interactions, drawing on cross-cultural examples from anthropology, ethnozoology, archaeology, history, and genetics.

Requisites: None**Course Designation:** Breadth – Either Biological Science or Social Science

Level – Elementary

L&S Credit – Counts as Liberal Arts and Science credit in L&S

Repeatable for Credit: No**Last Taught:** Summer 2022**Learning Outcomes:** 1. Develop skills in searching for and identifying literature using online and library resources, and gain familiarity with citing and referencing different source types.

Audience: Undergraduate

2. Synthesize scholarly articles in the areas of animal science, archaeology, biology, and history.

Audience: Undergraduate

3. Understand animal-human interactions from a global and historical perspective.

Audience: Undergraduate

4. Evaluate the archaeological, historical, and genetic lines of evidence used to generate hypothesis on past animal-human interactions.

Audience: Undergraduate

5. Develop a general chronology of the history of animal husbandry, livestock, and pet keeping around the world.

Audience: Undergraduate

6. Analyze the process of artificial selection and the different pathways to domestication (commensal, prey, or directed).

Audience: Undergraduate

7. Differentiate domesticated from tamed from feral and identify the behavioral and biological characteristics which makes certain animal favorable to domestication.

Audience: Undergraduate

8. Apply course material to evaluate the role of past animal interactions on contemporary issues in conservation and food security.

Audience: Undergraduate

AN SCI 245 – ANIMAL WELFARE

3 credits.

Explores animal welfare topics from the animal's perspective. Analyzes contemporary welfare issues and policies based on our scientific understanding of the experiences of animals. Emphasizes farmed animals, but also draws on examples from zoo, lab, and companion animals.

Requisites: None**Course Designation:** Breadth – Biological Sci. Counts toward the Natural Sci req

Level – Elementary

L&S Credit – Counts as Liberal Arts and Science credit in L&S

Repeatable for Credit: No**Last Taught:** Fall 2024**Learning Outcomes:** 1. Discuss the scientific process as applied to animal welfare

Audience: Undergraduate

2. Apply scientific concepts to analyze contemporary animal welfare issues

Audience: Undergraduate

3. Identify situations that may compromise welfare in diverse species and contexts

Audience: Undergraduate

4. Interpret scientific literature to evaluate animal welfare assurance programs

Audience: Undergraduate

5. Articulate concepts of animal welfare in oral and written format

Audience: Undergraduate

AN SCI 289 – HONORS INDEPENDENT STUDY

1-2 credits.

Honors research work under direct guidance of a faculty member in an area of Animal Sciences. Students are responsible for arranging the work and credits with the supervising instructor.

Requisites: Consent of instructor**Course Designation:** Honors – Honors Only Courses (H)**Repeatable for Credit:** Yes, unlimited number of completions**Last Taught:** Spring 2007**Learning Outcomes:** 1. Demonstrate content knowledge and skills as signified in an honors project or scholarly honors work.

Audience: Undergraduate

2. Articulate their honors experience to peers.

Audience: Undergraduate

3. Apply perspectives to composed work through engagement in academic experiences.

Audience: Undergraduate

AN SCI 299 – INDEPENDENT STUDY

1-3 credits.

Individual introductory to intermediate work under direct guidance of a faculty member in an area of Animal Sciences. Students are responsible for arranging the work and credits with the supervising instructor.

Requisites: Consent of instructor

Repeatable for Credit: Yes, unlimited number of completions

Last Taught: Summer 2025

Learning Outcomes: 1. Summarize intellectual growth associated with independent study work through mentor discussion.

Audience: Undergraduate

2. Identify diversity of viewpoints through critical thinking.

Audience: Undergraduate

3. Illustrate growth in reading, writing, and communication skills..

Audience: Undergraduate

AN SCI/FOOD SCI 305 – INTRODUCTION TO MEAT SCIENCE AND TECHNOLOGY

4 credits.

Application of biological, technological, and economical principles to muscle and related tissue utilized for food.

Requisites: (ZOOLOGY/BIOLOGY/BOTANY 152 or ZOOLOGY/BIOLOGY 101 and 102) and (CHEM 103, 109, or 115) or graduate/professional standing

Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement

Repeatable for Credit: No

Last Taught: Fall 2024

Learning Outcomes: 1. Discuss the nutritional value of fresh and processed meats in addition to addressing diet/health issues and food safety of these products

Audience: Both Grad & Undergrad

2. Describe the processes associated with animal harvest and explain the differences among different livestock species

Audience: Both Grad & Undergrad

3. Demonstrate where carcass fabrication cuts are made to produce the major carcass primal cuts and the ability to separate out and identify major muscles of economic importance

Audience: Both Grad & Undergrad

4. Describe how the biochemical properties of meat proteins relate to muscle function

Audience: Both Grad & Undergrad

5. Explain of the chemical and physical properties of fresh meat and how these properties can be evaluated and analyzed

Audience: Both Grad & Undergrad

6. Collect carcass data and determine USDA quality and yield grades

Audience: Both Grad & Undergrad

7. Calculate the appropriate amounts of non-meat ingredients and explain the applicable manufacturing procedures to produce various types of processed meats including whole muscle products and finely comminuted sausages

Audience: Both Grad & Undergrad

8. Explain how an understanding of muscle microstructure ultrastructure, and changes in postmortem biochemistry can be used to predict ultimate meat quality characteristics

Audience: Graduate

AN SCI/DY SCI/NUTR SCI 311 – COMPARATIVE ANIMAL NUTRITION

3 credits.

Nutrients and their assimilation, function, and interactions that affect metabolism in mammals. Differences among species will be used to emphasize unique digestive and physiological functions and how these differences affect metabolism of nutrients. Humans will be used in some comparisons. Follows physiological progression of nutrients, starting with an overview of the digestive tract followed by water and builds on specific roles of nutrients and substrates needed to provide basic processes required for maintenance, tissue accretion, and homeostatic regulation of nutrients.

Requisites: CHEM 341, 343, (BIOCHEM 301 or concurrent enrollment), or (BIOCHEM 501 or concurrent enrollment)

Course Designation: Breadth – Biological Sci. Counts toward the Natural Sci req

Level – Intermediate

L&S Credit – Counts as Liberal Arts and Science credit in L&S

Repeatable for Credit: No

Last Taught: Spring 2025

Learning Outcomes: 1. Recall and summarize the cellular, tissue, and whole-body metabolism and function of nutrients

Audience: Undergraduate

2. Identify key elements of digestive anatomy that enable digestion and absorption of consumed nutrients

Audience: Undergraduate

3. Explain the physiological processes required for assimilation of consumed macro- and micro-nutrients

Audience: Undergraduate

4. Compare the similarities and differences in nutritional and metabolic strategies across species

Audience: Undergraduate

5. Evaluate the interactions between nutrients, animals, environment, physiological status, and functions and integrate these interactions to understand whole-animal nutrition

Audience: Undergraduate

AN SCI 314 – POULTRY NUTRITION

3 credits.

Provides a conceptual understanding of nutrient requirements for optimal growth and production of commercial poultry species. The use of computer programming for feed formulation is emphasized.

Requisites: DY SCI/AN SCI 101

Repeatable for Credit: No

Last Taught: Summer 2019

Learning Outcomes: 1. Describe fundamental concepts of metabolizable energy, protein/amino acids, minerals and vitamins, digestive physiology, and their application in commercial poultry nutrition.

Audience: Undergraduate

2. Use a computer-based formulation program for least cost formulation of diets for poultry.

Audience: Undergraduate

3. Design effective poultry nutrition experiments and summarize and interpret the results of the experiments.

Audience: Undergraduate

4. Describe basic and practical aspects of feed milling/manufacturing

Audience: Undergraduate

5. Describe feeding programs for organic poultry production and production of niche poultry products and the use of feed additives in these programs

Audience: Undergraduate

AN SCI 315 – POULTRY ENTERPRISE MANAGEMENT

3 credits.

Fundamental business and economic principles and practices for successful poultry production with emphasis on problem solving in flock management.

Requisites: DY SCI/AN SCI 101

Repeatable for Credit: No

Last Taught: Summer 2019

Learning Outcomes: 1. Demonstrate a systematic approach to decision making within the poultry industry.

Audience: Undergraduate

2. Characterize fundamental business aspects for many segments of the poultry industry.

Audience: Undergraduate

3. Apply basic knowledge of the poultry industry for use in problem-solving.

Audience: Undergraduate

4. Demonstrate proper interviewing skills relevant to securing a career in the poultry industry.

Audience: Undergraduate

5. Describe key areas of emotional intelligence and personality traits and how they can impact employer/employee relationships.

Audience: Undergraduate

6. Develop a basic poultry operation business plan.

Audience: Undergraduate

AN SCI/DY SCI 320 – ANIMAL HEALTH AND DISEASE

3 credits.

Provides an introduction to and exploration of the interconnectivity between factors that affect health and disease and the central role of the immune system using infectious disease in animals as a key focus. Explores principal causes and identification of animal diseases, common diseases of farm animals, zoonoses and public health, disease prevention and management including biosecurity measures and host immune responses. Fosters appreciation for the translatability and universality of knowledge between human and animal health and disease.

Requisites: ZOOLOGY/BIOLOGY/BOTANY 151, (ZOOLOGY/BIOLOGY 101 and 102), BIOCORE 383, or graduate/professional standing

Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement

Repeatable for Credit: No

Last Taught: Spring 2025

Learning Outcomes: 1. Describe the interconnectivity and interdependence between factors that influence health and disease

Audience: Both Grad & Undergrad

2. Discuss fundamental biological and scientific concepts valuable for a career in animal agriculture, veterinary medicine, human medicine or biomedical animal research

Audience: Both Grad & Undergrad

3. Translate novel knowledge of health and disease in one species to another

Audience: Both Grad & Undergrad

4. Integrate concepts covered in the course and explore in depth how they are relevant to a specific challenge currently faced in animal health or disease.

Audience: Graduate

AN SCI/FOOD SCI 321 – FOOD LAWS AND REGULATIONS

1 credit.

Food laws and regulations, regulatory and commercial grading standards used in the food industry.

Requisites: Junior standing

Repeatable for Credit: No

Last Taught: Spring 2025

Learning Outcomes: 1. Identify major food laws, their authoritative departments and enforcement agencies (regulatory framework)

Audience: Undergraduate

2. Identify, examine and analyze the implications of laws and regulations required for the manufacture and sale of food products

Audience: Undergraduate

3. Discuss current topics of importance to the food industry that have the potential to generate new or refine existing regulations on food laws and regulations that apply to specific segments of the food industry

Audience: Undergraduate

4. Find pertinent information on food laws and regulations that apply to specific segments of the food industry

Audience: Undergraduate

AN SCI 324 – APPLIED COMPANION ANIMAL BEHAVIOR AND LEARNING

3 credits.

Explore companion animal behavior and learning. Examine species-specific and abnormal behavior in a variety of environments where companion animals exist. Investigate basic learning principles and how they can be applied to companion animals.

Requisites: (DY SCI/AN SCI 102 or concurrent enrollment) or graduate/professional standing

Course Designation: Level - Elementary

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Grad 50% - Counts toward 50% graduate coursework requirement

Repeatable for Credit: No

Learning Outcomes: 1. Describe species-specific behavior in companion animals

Audience: Both Grad & Undergrad

2. Construct an ethogram and use it to record and track companion animal behavior

Audience: Both Grad & Undergrad

3. Differentiate between different forms of behavior modification

Audience: Both Grad & Undergrad

4. Identify abnormal behavior and theorize how the behavior developed and is maintained

Audience: Both Grad & Undergrad

5. Identify a problem behavior in a companion animal, and design a behavior modification plan to address that behavior

Audience: Graduate

AN SCI/BOTANY/MICROBIO 335 – THE MICROBIOME OF PLANTS, ANIMALS, AND HUMANS

3 credits.

Examination of the structure and function of microbial communities that live inside and on host organisms (plants, animals, and humans). Introduction to general concepts of the microbiome and microbiota, and their relationship to host nutrition, health, and disease.

Requisites: MICROBIO 101 or 303 or graduate/professional standing

Course Designation: Breadth - Biological Sci. Counts toward the Natural Sci req

Level - Intermediate

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Repeatable for Credit: No

Last Taught: Spring 2025

Learning Outcomes: 1. Describe how microorganisms interact with plant and animal (including human) hosts in beneficial, neutral or detrimental ways.

Audience: Undergraduate

2. Express how the environment affects these host-microbe interactions.

Audience: Undergraduate

3. Summarize new molecular and bioinformatic methods that allow for the study of microbial communities.

Audience: Undergraduate

4. Describe how microbial communities are essential for life as we know it, and the processes that support life.

Audience: Undergraduate

5. Articulate several ways in which microbial communities are essential to plant and animal (including human) health.

Audience: Undergraduate

6. Explain our current knowledge about the diversity of microbial life and why its effects and potential benefits have not been fully explored.

Audience: Undergraduate

AN SCI 336 – ANIMAL GROWTH AND DEVELOPMENT

3 credits.

Covers growth and development of an animal from a single cell to an organism and factors such as nutrition, hormone, genetics and gut microbes influencing growth and development in both cell and tissue levels. Includes the molecular and cellular basis of prenatal and postnatal growth and development. Focuses on development and growth of tissues including muscle, adipose, connective, mammary, and bone tissues that are associated with animal production. Also includes the use of growth promotants in livestock to improve growth performance and increase the quality of carcasses and animal production.

Requisites: (ZOOLOGY/BIOLOGY/BOTANY 151 and 152), (ZOOLOGY/BIOLOGY 101 and 102), or BIOCORE 383

Course Designation: Breadth – Biological Sci. Counts toward the Natural Sci req

Level – Intermediate

L&S Credit – Counts as Liberal Arts and Science credit in L&S

Repeatable for Credit: No

Last Taught: Fall 2024

Learning Outcomes: 1. Describe the process of growth and development from a single cell level to a whole organism level

Audience: Undergraduate

2. Describe the principles and basic biological functions associated with animal growth and development applied to animal production systems

Audience: Undergraduate

3. Explain what factors affect livestock growth and development and how alteration of these factors impacts growth performance of livestock

Audience: Undergraduate

4. Integrate and apply multi-disciplinary knowledge acquired from this course to estimate and enhance growth and efficiency of animal products

Audience: Undergraduate

AN SCI/BSE 344 – DIGITAL TECHNOLOGIES FOR ANIMAL MONITORING

3 credits.

Introduces key concepts of sensor technology used for livestock and companion animal monitoring and veterinary medicine. Describes applications of Artificial Intelligence (AI) systems for livestock animals and veterinary medicine, including animal monitoring, computer-aided diagnosis, and optimized farm management decisions.

Requisites: (MATH 112, 114, 171, or placement into MATH 221) or graduate/professional standing

Repeatable for Credit: No

Last Taught: Spring 2025

Learning Outcomes: 1. Explain what precision livestock is and why it is needed

Audience: Undergraduate

2. Demonstrate familiarity with data science and artificial intelligence principles as applied to agricultural systems and veterinary medicine

Audience: Undergraduate

3. Describe the current sensor sensing technologies used in livestock and companion animals

Audience: Undergraduate

4. Explain principles and applications of sensor technology applied to animals

Audience: Undergraduate

5. Identify artificial intelligence applications in veterinary medicine

Audience: Undergraduate

6. Evaluate the major ethical concerns associated with Artificial Intelligence for agriculture

Audience: Undergraduate

AN SCI/DY SCI 361 – INTRODUCTION TO ANIMAL AND VETERINARY GENETICS

2 credits.

The molecular basis for inheritance of monogenic and polygenic traits related to animal disease and production. An introduction to the principles of improving animal health and performance by selection and mating systems in companion animals, horses, livestock, and poultry.

Requisites: ZOOLOGY/BIOLOGY/BOTANY 151, (ZOOLOGY/BIOLOGY 101 and 102), or (BIOCORE 382, 383, and 384) or graduate/professional standing

Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement

Repeatable for Credit: No

Last Taught: Spring 2025

Learning Outcomes: 1. Retrieve, analyze and interpret gene and genomic data for species conservation, genetic variants and gene function
Audience: Both Grad & Undergrad

2. Apply genotype data to determination of animal parentage and mapping of variants underlying genetic variation for animal traits
Audience: Both Grad & Undergrad

3. Articulate knowledge of methods used to discover and modify genetic information for purposes of altering phenotypes
Audience: Both Grad & Undergrad

4. Identify the key components of the basic genetic model describing the expression of phenotypic traits
Audience: Both Grad & Undergrad

5. Explain the four forces that change gene frequency: selection, drift, mutation and migration
Audience: Both Grad & Undergrad

6. Calculate and interpret the coefficients of a simple linear regression to determine the expected genetic change from phenotypic selection
Audience: Both Grad & Undergrad

7. Calculate the detection probability of a recessive genotype for some simple mating systems
Audience: Both Grad & Undergrad

8. Examine opportunities for genetic improvement of a trait in a species of interest using knowledge gained in the course, comparing alternative strategies and expected outcomes with the results of their analysis
Audience: Graduate

AN SCI/DY SCI 362 – VETERINARY GENETICS

2 credits.

The genetic basis for predisposition to disease or resistance to disease in livestock and companion animal species. Genetic defects, their discovery, diagnosis and treatment.

Requisites: DY SCI/AN SCI 361 or concurrent enrollment

Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement

Repeatable for Credit: No

Last Taught: Spring 2025

Learning Outcomes: 1. Evaluate critically the primary literature in the genetic variants and their role in animal phenotypes and disease
Audience: Both Grad & Undergrad

2. Describe how gene x environment interactions affect gene expression and how these effects can be transmitted to the next generations
Audience: Both Grad & Undergrad

3. Use animal biotechnology knowledge and biomedical models to design experiments to treat animal diseases and alter phenotypes
Audience: Both Grad & Undergrad

4. Explain the processes by which epigenetic marks regulate gene expression and how these marks can be manipulated
Audience: Both Grad & Undergrad

5. Generate a hypothesis from a set of observations related to the genetic basis of animal production and then design experiments to test the hypothesis
Audience: Graduate

AN SCI/DY SCI 363 – PRINCIPLES OF ANIMAL BREEDING

2 credits.

Application of the principles of quantitative genetics to the improvement of livestock and poultry; breeding value estimation and selection techniques; effects of inbreeding and hybrid vigor; crossbreeding systems.

Requisites: DY SCI/AN SCI 361 or concurrent enrollment

Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement

Repeatable for Credit: No

Last Taught: Spring 2025

Learning Outcomes: 1. Calculate and interpret the values of narrow and broad sense heritabilities as well as repeatability of quantitative traits given their genetic and environmental variance components

Audience: Both Grad & Undergrad

2. Apply additive and multiplicative adjustments on phenotypic traits to correct for environmental effects

Audience: Both Grad & Undergrad

3. Interpret key components of sire summaries

Audience: Both Grad & Undergrad

4. Calculate expected correlated response to selection

Audience: Both Grad & Undergrad

5. Calculate retained hybrid vigor for various crossbreeding schemes in livestock

Audience: Both Grad & Undergrad

6. Perform quantitative genetic analysis of family data using linear regression and analysis of variance techniques

Audience: Graduate

AN SCI 366 – CONCEPTS IN GENOMICS

3 credits.

Genomics has revolutionized many fields of science, including animal breeding, plant breeding, physiology, microbiology, and human medicine. A basic overview of the latest concepts in genomics, including 3D genome organization, the importance of genome annotation, the use of genomic testing in plant and animal breeding, the potential of genomic prediction on human medicine, and the latest advances in omics integration.

Requisites: Junior Standing and BOTANY/BIOLOGY/ZOOLOGY 152, (BIOLOGY/ZOOLOGY 101, 102, and BIOLOGY/BOTANY 130), BIOCORE 381, or graduate/professional standing

Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement

Repeatable for Credit: No

Last Taught: Fall 2024

Learning Outcomes: 1. Recognize the importance of functional annotation

Audience: Both Grad & Undergrad

2. Explain the principles of gene mapping and genomic testing

Audience: Both Grad & Undergrad

3. Describe the impact of genomic selection on agriculture

Audience: Both Grad & Undergrad

4. Recognize the potential of genomic prediction on human medicine

Audience: Both Grad & Undergrad

5. Describe the latest advances in multi-omics data integration

Audience: Both Grad & Undergrad

6. Explain the principles of pathway analysis and network inference

Audience: Graduate

7. Describe available tools and software for omics analyses

Audience: Graduate

AN SCI/DY SCI 370 – LIVESTOCK PRODUCTION AND HEALTH IN AGRICULTURAL DEVELOPMENT

3 credits.

Physical, biological and social nature of animal agriculture systems and their improvement in developing countries; analysis of the state of livestock research and development in the developing countries and the world role of U.S. animal agriculture.

Requisites: DY SCI/AN SCI 101, ZOOLOGY/BIOLOGY/BOTANY 151, ZOOLOGY/BIOLOGY 101, or (BIOCORE 381 and 382), or graduate/professional standing

Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement

Repeatable for Credit: No

Last Taught: Fall 2024

Learning Outcomes: 1. Describe the physical, biological and social nature of animal agriculture and its improvement in developing countries.

Audience: Both Grad & Undergrad

2. Analyze the constraints to improving livestock production on resource poor farms in developing countries.

Audience: Both Grad & Undergrad

3. Demonstrate knowledge about institutional infrastructures involved in research, education, and development projects in animal agriculture.

Audience: Both Grad & Undergrad

4. Develop skills needed to analyze and project strategies for improvement of a production system in a developing country.

Audience: Graduate

AN SCI/DY SCI 373 – ANIMAL PHYSIOLOGY

3 credits.

Covers physiological processes that regulate the body and the anatomy and function of different physiological systems. Includes interactions between organ systems, analysis of a single organ system from the molecular to the organismal, and comparisons and contrasts of organ systems among different domestic animal species.

Requisites: ZOOLOGY/BIOLOGY/BOTANY 151, (ZOOLOGY/BIOLOGY 101 and 102), or BIOCORE 383

Course Designation: Breadth - Biological Sci. Counts toward the Natural Sci req

Level - Intermediate

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Repeatable for Credit: No

Last Taught: Spring 2025

Learning Outcomes: 1. Integrate the physiological processes that regulate the body of different animal species (largely domestic animals and humans)

Audience: Undergraduate

2. Synthesize the regulation of an organ system from the molecular level all the way to the whole animal level and apply knowledge of a physiological mechanism to explain how a whole animal physiological process occurs

Audience: Undergraduate

3. Integrate interactions between different organ systems (homeostasis) and explain the anatomy of different physiological systems and their specific functions

Audience: Undergraduate

4. Determine how changes in internal or external environment will alter physiologic processes to deal with these changes

Audience: Undergraduate

5. Determine how changes in one physiological system may impact a different physiological system

Audience: Undergraduate

6. Describe similarities and differences in physiologic systems between animal species (with emphasis on domestic animals and humans)

Audience: Undergraduate

AN SCI 375 – SPECIAL TOPICS

1-4 credits.

Various topics in Animal Science of current interest to undergraduate students.

Requisites: None

Repeatable for Credit: Yes, unlimited number of completions

Last Taught: Fall 2024

Learning Outcomes: 1. Analyze concepts and processes related to specific topics in Animal Sciences.

Audience: Undergraduate

2. Integrate and apply knowledge to understand issues associated with in animal industries.

Audience: Undergraduate

3. Synthesize scientific literature to develop critical thinking skills.

Audience: Undergraduate

AN SCI 377 – INTEGRATIVE ANIMAL PHYSIOLOGY LABORATORY

1 credit.

Provides immersive, hands-on training in large animal procedural and surgical techniques to develop knowledge and appreciation for the interconnectivity and interdependence between physiological processes of the various organ systems. Serves as an introduction to translatable skills for careers in biomedical animal research, veterinary medicine, or human medicine.

Requisites: ZOOLOGY/BIOLOGY/BOTANY 151, (ZOOLOGY/BIOLOGY 101 and 102), or BIOCORE 383

Repeatable for Credit: No

Learning Outcomes: 1. Describe the interconnectivity and interdependence between physiological processes and anatomical systems.

Audience: Undergraduate

2. Perform basic techniques in animal handling, anesthesia, and surgical procedures.

Audience: Undergraduate

3. Communicate information and thoughts effectively within a team performing complex procedures.

Audience: Undergraduate

AN SCI 399 – COORDINATIVE INTERNSHIP/COOPERATIVE EDUCATION

1-8 credits.

An internship under guidance of a faculty or instructional academic staff member in Animal and Dairy Sciences and internship site supervisor.

Students are responsible for arranging the work and credits with the faculty or instructional academic staff member and the internship site supervisor.

Requisites: Consent of instructor

Course Designation: Level - Advanced

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Workplace - Workplace Experience Course

Repeatable for Credit: Yes, unlimited number of completions

Last Taught: Summer 2025

Learning Outcomes: 1. Establish a network of mentors to support academic and professional growth.

Audience: Undergraduate

2. Develop and illustrate specialized skills relevant to the focus of study associated with internship program.

Audience: Undergraduate

3. Differentiate a diversity of disciplinary approaches and viewpoints in the agriculture industry.

Audience: Undergraduate

AN SCI 400 – STUDY ABROAD IN ANIMAL SCIENCES

1-6 credits.

Provides an area equivalency for courses taken on Madison Study Abroad Programs that do not equate to existing UW courses.

Requisites: None

Repeatable for Credit: Yes, unlimited number of completions

AN SCI/DY SCI 414 – RUMINANT NUTRITION & METABOLISM

3 credits.

Integrates nutritional and biochemical concepts to understand digestive and metabolic processes in dairy and beef cattle, which are then quantitatively represented to predict and manipulate production and health outcomes.

Requisites: DY SCI/AN SCI/NUTR SCI 311, (BIOCHEM 301 or 501) or graduate/professional standing

Course Designation: Breadth – Biological Sci. Counts toward the Natural Sci req

Level – Intermediate

L&S Credit – Counts as Liberal Arts and Science credit in L&S

Grad 50% – Counts toward 50% graduate coursework requirement

Repeatable for Credit: No

Last Taught: Fall 2024

Learning Outcomes: 1. Integrate nutritional and biochemical concepts to understand digestion and metabolism of nutrients.

Audience: Both Grad & Undergrad

2. Predict quantitative metabolic and production outcomes in ruminants.

Audience: Both Grad & Undergrad

3. Determine the role of metabolism in feed efficiency, animal production and health, and environmental load of ruminant production systems.

Audience: Both Grad & Undergrad

4. Investigate, interpret, summarize, and debate findings from scientific literature in order to develop and communicate recommendations for ruminant diets to identified audiences.

Audience: Both Grad & Undergrad

5. Apply research models to experimental and production data to predict metabolic outcomes

Audience: Graduate

AN SCI 415 – APPLICATION OF MONOGASTRIC NUTRITION PRINCIPLES

2 credits.

Nutrient requirements for growth and production of monogastric animals. Discuss concepts of establishing nutrient requirements and feeding strategies. Laboratory exercises are designed to develop problem solving skills required for the assessment of nutritional adequacy and economical soundness of feeding programs.

Requisites: DY SCI/AN SCI/NUTR SCI 311, (BIOCHEM 301 or 501) or graduate/professional standing

Course Designation: Grad 50% – Counts toward 50% graduate coursework requirement

Repeatable for Credit: No

Last Taught: Fall 2024

Learning Outcomes: 1. Identify classifications and profiles of major feed ingredients used to supply nutrients for monogastric animals

Audience: Both Grad & Undergrad

2. Assess the major nutrient requirements for monogastric animals established by empirical experimental methods

Audience: Both Grad & Undergrad

3. Build spreadsheets to calculate mathematical solutions required for formulations of complete diets for monogastric animals

Audience: Both Grad & Undergrad

4. Design an experiment and critique the results

Audience: Both Grad & Undergrad

5. Participate in discussions of laboratory assignments and presentations of experimental results

Audience: Both Grad & Undergrad

6. Provide a completed statistical analysis of the data from the animal trials with a defense for the analysis provided in the oral presentation

Audience: Graduate

AN SCI 420 – MICROBIOMES OF ANIMAL SYSTEMS

3 credits.

Provides a knowledgebase in both theoretical and applied scientific approaches associated with microbiome sciences in animal production systems. Covers the basic principles of microbiology through applied practical approaches in using cross-species comparisons in companion and agricultural species from classical microbiological techniques to novel next-generation sequence-based approaches.

Requisites: (BIOLOGY/ZOOLOGY 101 and 102, BOTANY/BIOLOGY/ZOOLOGY 151, BOTANY/BIOLOGY 130, or BIOCORE 383) and (CHEM 341, 343, or BIOCHEM 301), or graduate/professional standing

Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement

Repeatable for Credit: No

Last Taught: Spring 2025

Learning Outcomes: 1. Compare and contrast the anatomic differences and basic functions of the GI tract across agricultural species.

Audience: Both Grad & Undergrad

2. Apply biochemical concepts to evaluate the impact of substrates on microbial bioenergetics, growth yield, and the establishment and stability of microbial communities

Audience: Both Grad & Undergrad

3. Evaluate and recommend approaches to assess microbiome diversity and function.

Audience: Both Grad & Undergrad

4. Relate basic principles of microbial community membership and function in the context of host-microbe crosstalk.

Audience: Both Grad & Undergrad

5. Associate internal versus external environmental pressures that influence microbial niches and cross-kingdom interactions.

Audience: Both Grad & Undergrad

6. Critically evaluate key literature related to studying the microbiome of animal systems

Audience: Graduate

AN SCI 431 – BEEF CATTLE PRODUCTION

3 credits.

Application of genetics, systems of mating, physiology, nutrition and economics to the production of beef.

Requisites: NUTR SCI/AN SCI/DY SCI 311, DY SCI/AN SCI 361, and (DY SCI/AN SCI 434 or concurrent registration) or graduate/professional standing

Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement

Repeatable for Credit: No

Last Taught: Fall 2022

Learning Outcomes: 1. Apply principles from pre-requisite courses to production systems for beef cattle and appreciate management practices specific to these systems.

Audience: Both Grad & Undergrad

2. Integrate fundamental principles of beef cattle biology and economics into a business plan of their design.

Audience: Both Grad & Undergrad

3. Analyze and evaluate beef production systems.

Audience: Graduate

AN SCI 432 – SWINE PRODUCTION

3 credits.

Application of research findings in breeding, feeding, management and marketing to modernize production. Lab may include farm visits, practical exercises in testing changes, and "tools" used by producers.

Requisites: NUTR SCI/AN SCI/DY SCI 311, DY SCI/AN SCI 361, DY SCI/AN SCI 434, or graduate/professional standing

Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement

Repeatable for Credit: No

Last Taught: Spring 2022

Learning Outcomes: 1. Be able to describe and contrast current topics in the context of historical perspectives that influence the current and future US commercial swine industry.

Audience: Both Grad & Undergrad

2. Evaluate and integrate the foundational principles in swine nutrition, reproduction, breeding, genetic selection, herd health management, biosecurity protocols, animal behavior, swine husbandry, marketing, and housing to discern swine production practices which improve animal well-being and sustainable swine production in a manner that is acceptable to consumers

Audience: Both Grad & Undergrad

3. Develop an ability to link components of a production system to market costs and revenues.

Audience: Both Grad & Undergrad

4. Gain hands-on experience with common swine production techniques

Audience: Both Grad & Undergrad

5. Diversify student experience with a major food animal species and the industries and career opportunities associated with the swine industry.

Audience: Both Grad & Undergrad

6. Extend academic experience acquired in the Animal Sciences department into areas of personal interest and develop new ideas working with academic and industrial organizations

Audience: Graduate

AN SCI/DY SCI 434 – REPRODUCTIVE PHYSIOLOGY

3 credits.

Principles of reproductive physiology, improvement of fertility, and artificial insemination.

Requisites: ZOOLOGY/BIOLOGY/BOTANY 152, (ZOOLOGY/BIOLOGY 101 and 102) or (BIOCORE 382, 383, and 384) or graduate/professional standing

Course Designation: Breadth - Biological Sci. Counts toward the Natural Sci req

Level - Intermediate

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Grad 50% - Counts toward 50% graduate coursework requirement

Repeatable for Credit: No

Last Taught: Fall 2024

Learning Outcomes: 1. Identify structures and function of reproductive anatomy in the male and female of all livestock species, humans, pets and wildlife

Audience: Both Grad & Undergrad

2. Identify hormones, their production site, physiology impacts and how to manipulate specific hormones to control reproduction either positively or negatively

Audience: Both Grad & Undergrad

3. Summarize critical components of reproductive technologies involved in breeding, semen collection, gamete biology and embryonic development. Demonstrate ability to monitor and manipulate cyclicity, artificial insemination, and pregnancy detection in both horses and pigs

Audience: Both Grad & Undergrad

4. Summarize events in reproduction from the cellular to whole animal level in livestock species, humans, pet species and wildlife

Audience: Both Grad & Undergrad

5. Communicate via oral, written, podcast, and website modalities

Audience: Both Grad & Undergrad

6. Solve reproductive physiology problems associated with a foreign country or novel region of U.S. including how to digitally communicate with local residents who may not speak English

Audience: Both Grad & Undergrad

7. Identify how ethical issues in global agriculture, wildlife management, and federal grazing lands impact reproductive management of livestock

Audience: Both Grad & Undergrad

8. Evaluate effective learning outcomes of a specific lab and access its impact on undergraduate students

Audience: Graduate

AN SCI 435 – ANIMAL SCIENCES PROSEMINAR

2 credits.

Methods of assessing information quality are studied. Each student develops an analytical and critical seminar on a topic of personal interest in the animal sciences.

Requisites: None

Repeatable for Credit: No

Last Taught: Fall 2024

Learning Outcomes: 1. Apply the knowledge and skills acquired in the different areas of Animal Sciences to solve a specific problem using a multidisciplinary approach

Audience: Undergraduate

2. Analyze academic, professional, societal, economic, ethical, or scientific issues related to Animal Science and construct creative solutions for those issues

Audience: Undergraduate

3. Communicate and extend the capstone experience to refine research skills and demonstrate proficiency in written and oral forms

Audience: Undergraduate

4. Extend academic experience acquired in the Animal Sciences department into areas of personal interest and develop new ideas working with academic and industrial organizations.

Audience: Undergraduate

AN SCI/DY SCI/FOOD SCI/SOIL SCI 472 – ANIMAL AGRICULTURE AND GLOBAL SUSTAINABLE DEVELOPMENT

1 credit.

Examines issues related to global agriculture and healthy sustainable development. Using a regional approach and focusing on crops and livestock case studies, students will learn the interdependence between US agriculture and agriculture in emerging economies. Some topics covered include population and food, immigration, the environment; crop and livestock agriculture; global trade; sustainability; food security, the role of women in agriculture, and the role of dairy products in a healthy diet.

Requisites: None

Repeatable for Credit: No

Last Taught: Spring 2024

Learning Outcomes: 1. Apply sustainability principles and/or framework to addressing the challenge of feeding an increasing world population sustainably.

Audience: Undergraduate

2. Define and characterize sustainability, sustainable agriculture and Sustainable Development

Audience: Undergraduate

3. Analyze the contributions of animal agriculture to the Sustainable Development Goals both in developing and developed countries.

Audience: Undergraduate

4. Explain the social, economic, and/or environmental dimensions of the sustainability challenges of diverse animal agricultural systems both in developing and developed countries.

Audience: Undergraduate

5. Evaluate the role of livestock in communities where poverty, hunger and marginalization are embedded as a way of life.

Audience: Undergraduate

6. Critically evaluate the causes of –and ways to break– the chains of hunger and poverty among the poorest of the poor.

Audience: Undergraduate

AN SCI/DY SCI/FOOD SCI/SOIL SCI 473 – INTERNATIONAL FIELD STUDY IN ANIMAL AGRICULTURE AND SUSTAINABLE DEVELOPMENT

2 credits.

Examines issues related to global agriculture and healthy sustainable development. Using a regional approach and focusing on crops and livestock case studies, students will learn the interdependence between US agriculture and agriculture in emerging economies. Some topics covered include population and food, immigration, the environment; crop and livestock agriculture; global trade; sustainability; and the role of women in agriculture and the role of dairy products in a healthy diet.

Requisites: DY SCI/AN SCI/FOOD SCI/SOIL SCI 472**Repeatable for Credit:** No**Learning Outcomes:** 1. Improve communication and interpersonal skills associated with participating in team-based intercultural experiences

Audience: Undergraduate

2. Be better prepared for professional success in an interconnected world by navigating unfamiliar cultural norms and societal differences

Audience: Undergraduate

3. Reflect on US-centric personal and cultural values while building an appreciation and respect for the Latin America culture.

Audience: Undergraduate

4. Explain the social, economic, and/or environmental dimensions of the sustainability challenge of alleviating poverty and malnutrition in Mexico

Audience: Undergraduate

5. Apply sustainability principles and/or framework to addressing the challenge of fostering prosperity in marginalized indigenous communities

Audience: Undergraduate

6. Analyze both from their own disciplinary lens and from an interdisciplinary lens the contributions of dairy farming to the Sustainable Development Goals

Audience: Undergraduate

7. Evaluate the sustainability of subsistence, market-oriented, and industrial-scale farming systems

Audience: Undergraduate

AN SCI 503 – AVIAN PHYSIOLOGY

3 credits.

Principles of organ and system function with emphasis on male and female reproduction, embryonic development and factors affecting hatchability.

Requisites: DY SCI/AN SCI 101**Repeatable for Credit:** No**Last Taught:** Summer 2019**Learning Outcomes:** 1. Describe the major functions and processes associated with behavior, nervous, muscular, cardiovascular, immune, digestive, endocrine and reproductive system.

Audience: Undergraduate

2. Describe physiological processes that are unique to avian species and that provide challenges and opportunities for housing and management in the poultry industry.

Audience: Undergraduate

3. Critically evaluate and communicate both verbally and written scientific research that integrates physiological concepts discussed in class.

Audience: Undergraduate

AN SCI 508 – POULTRY PRODUCTS TECHNOLOGY

3 credits.

Procurement, processing and distribution of poultry meat, eggs and derived products; factors affecting quality, including methods of determining quality.

Requisites: CHEM 103, 109, or 115**Repeatable for Credit:** No**Last Taught:** Summer 2019**Learning Outcomes:** 1. Relate physiological processes during animal growth and tissue harvest to quality attributes in the resulting food

Audience: Undergraduate

2. Utilize principles of pH, ionic strength, isoelectric point, fermentation, curing, temperature, antimicrobial use, and antioxidant technology to ensure that manufactured products are safe to eat, have the desired sensory attributes, and have extended shelf life

Audience: Undergraduate

3. Differentiate function(s) from sensory effect(s) for the wide range of ingredients found on labels of various meat products

Audience: Undergraduate

4. Identify the various chemical, physical, and thermal processes that go into producing a high-quality product with emphasis on how the order of each process during manufacturing is relevant

Audience: Undergraduate

5. Measure quality attributes of the different products produced in the laboratory segments

Audience: Undergraduate

AN SCI 511 – BREEDER FLOCK AND HATCHERY MANAGEMENT

3 credits.

History of artificial incubation relevant to the U.S. hatching industry. Practices involved in successful incubation of hatching eggs. Embryonic development in birds. Management factors involved in breeder hen production and operating a hatchery.

Requisites: DY SCI/AN SCI 101**Repeatable for Credit:** No**Last Taught:** Summer 2019**Learning Outcomes:** 1. Identify normal incubation requirements and problems associated with improper conditions.

Audience: Undergraduate

2. Evaluate biosecurity plans and measures of microbial cleanliness of hatcheries.

Audience: Undergraduate

3. Identify current management systems for poultry breeding flocks and understand differences among different species.

Audience: Undergraduate

4. Apply knowledge of incubation and breeder management systems to analyze industry situations.

Audience: Undergraduate

AN SCI 512 – MANAGEMENT FOR AVIAN HEALTH

3 credits.

The occurrence, etiology, clinical signs, control and prevention of infectious and noninfectious diseases commonly affecting domestically reared poultry. Instruction in avian necropsy, zoonosis, sanitation and regulation.

Requisites: DY SCI/AN SCI 101**Repeatable for Credit:** No**Last Taught:** Summer 2019**Learning Outcomes:** 1. Identify and describe the origins of disease, methods to control infections through immunological function, vaccination, sanitation, biosecurity, and regulatory agency response

Audience: Undergraduate

2. Identify and distinguish normal and abnormal signs caused by disease

Audience: Undergraduate

3. Describe the microbial world of infectious disease

Audience: Undergraduate

4. Explain human's role in transmission of disease

Audience: Undergraduate

5. Develop a visual understanding of gross lesions caused by disease

Audience: Undergraduate

AN SCI/FOOD SCI 515 – COMMERCIAL MEAT PROCESSING

2 credits.

Principles and procedures in the commercial manufacture of processed meat products; sausage manufacturing, curing, smoking, freezing and packaging.

Requisites: AN SCI/FOOD SCI 305, FOOD SCI 410, or graduate/professional standing**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement**Repeatable for Credit:** No**Last Taught:** Spring 2025**Learning Outcomes:** 1. Summarize the various chemical and physical properties of meat and non-meat ingredients used to manufacture processed meats

Audience: Both Grad & Undergrad

2. Formulate various processed meats in compliance with governmental regulations

Audience: Both Grad & Undergrad

3. Identify basic meat processing principles

Audience: Both Grad & Undergrad

4. Demonstrate the ability to determine if a thermal processing procedure will produce a safe product

Audience: Graduate

5. Recognize how various types of meat processing equipment operate

Audience: Both Grad & Undergrad

6. Summarize proper cleaning and sanitation procedures

Audience: Both Grad & Undergrad

AN SCI/F&W ECOL/ZOOLOGY 520 – ORNITHOLOGY

3 credits.

Introduction to bird biology, ecology, and behavior. Topics include the evolutionary origin of birds and flight, anatomy and physiology, functional morphology, migration, communication, reproductive strategies, ecological adaptations and roles, and biogeographical patterns.

Requisites: ZOOLOGY/BIOLOGY 101 and 102, ZOOLOGY/BIOLOGY/BOTANY 152, (BIOCORE 381 and 382), or graduate/professional standing**Course Designation:** Breadth - Biological Sci. Counts toward the Natural Sci req

Level - Intermediate

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Grad 50% - Counts toward 50% graduate coursework requirement

Repeatable for Credit: No**Last Taught:** Spring 2025

AN SCI/F&W ECOL/ZOOLOGY 521 – BIRDS OF SOUTHERN WISCONSIN

3 credits.

Outdoor and indoor labs/lectures emphasizing identification of southern Wisconsin birds by sight and vocalization. Two required Saturday field trips in Southern Wisconsin.

Requisites: ZOOLOGY/BIOLOGY 101 and 102, ZOOLOGY/BIOLOGY/BOTANY 152, (BIOCORE 381 and 382), or graduate/professional standing

Course Designation: Breadth – Biological Sci. Counts toward the Natural Sci req

Level – Intermediate

L&S Credit – Counts as Liberal Arts and Science credit in L&S

Grad 50% – Counts toward 50% graduate coursework requirement

Repeatable for Credit: No

Last Taught: Spring 2025

AN SCI 610 – QUANTITATIVE GENETICS

3 credits.

An advanced approach with emphasis on statistical foundations. Classical theory with extensions to maternal and paternal effects. Selection theory is considered in depth.

Requisites: Graduate/professional standing

Course Designation: Breadth – Biological Sci. Counts toward the Natural Sci req

Level – Advanced

L&S Credit – Counts as Liberal Arts and Science credit in L&S

Grad 50% – Counts toward 50% graduate coursework requirement

Repeatable for Credit: No

Last Taught: Fall 2023

Learning Outcomes: 1. demonstrate an understanding regarding the various components contributing to variation of phenotypic traits
Audience: Graduate

2. estimate basic genetic parameters of phenotypic traits using family data
Audience: Graduate

3. compare different selection strategies in terms of expected genetic change
Audience: Graduate

4. perform gene mapping using molecular marker data
Audience: Graduate

5. examine and critically evaluate technical literature related to quantitative genetics
Audience: Graduate

6. assess advantages and disadvantages of indirect genetic selection
Audience: Graduate

7. perform mixed model analysis to infer variance components and to compute estimated breeding values
Audience: Graduate

AN SCI/NUTR SCI 626 – EXPERIMENTAL DIET DESIGN

1 credit.

Discuss nutrient requirements, composition of ingredients used to meet requirements and the mathematical steps involved in diet formulation with emphasis on research animals and human subjects.

Requisites: Graduate/professional standing

Course Designation: Grad 50% – Counts toward 50% graduate coursework requirement

Repeatable for Credit: No

Last Taught: Fall 2023

Learning Outcomes: 1. Develop an understanding of nutrient requirements, ingredients used to meet requirements, and the mathematical steps involved in diet formulation, with emphasis on research animals.
Audience: Both Grad & Undergrad

2. Develop skills required to formulate and prepare research diets
Audience: Both Grad & Undergrad

3. Develop an appreciation of nutrient requirements and the nutrient content of foods in development of healthy human diets.
Audience: Graduate

AN SCI 681 – SENIOR HONOR THESIS

2-4 credits.

Individual study for majors completing theses for Honors degrees as arranged with a faculty member.

Requisites: Consent of instructor

Course Designation: Honors – Honors Only Courses (H)

Repeatable for Credit: No

Last Taught: Spring 2024

Learning Outcomes: 1. Develop objectives and formulate hypothesis into experimental methods
Audience: Undergraduate

2. Participate in a supportive community of academically engaged peers
Audience: Undergraduate

3. Develop a research proposal and implement research project under supervision of a honors faculty mentor
Audience: Undergraduate

4. Demonstrate intellectual curiosity through engagement in challenging academic experiences
Audience: Undergraduate

AN SCI 682 – SENIOR HONORS THESIS

2-4 credits.

Second semester of individual study for majors completing theses for Honors degrees as arranged with a faculty member.

Requisites: Consent of instructor

Course Designation: Honors - Honors Only Courses (H)

Repeatable for Credit: Yes, unlimited number of completions

Last Taught: Fall 2024

Learning Outcomes: 1. Demonstrate advanced content knowledge as reflected in an honors thesis, publication, performance, or scholarly work

Audience: Undergraduate

2. Articulate the value of the honors experience to peers and to a broader community

Audience: Undergraduate

AN SCI 691 – THESIS

2 credits.

Individual study for majors completing theses as arranged with a faculty member.

Requisites: Consent of instructor

Repeatable for Credit: No

Last Taught: Fall 2022

Learning Outcomes: 1. Develop questions to address important gaps in the scientific literature of your topic of interest

Audience: Undergraduate

2. Analyze and select optimal research approaches to address scientific questions

Audience: Undergraduate

3. Develop objectives and formulate hypothesis into experimental methods

Audience: Undergraduate

4. Implement research project under supervision of thesis mentor

Audience: Undergraduate

AN SCI 692 – THESIS

2 credits.

Second semester of individual study for majors completing theses as arranged with a faculty member.

Requisites: Consent of instructor

Repeatable for Credit: No

Last Taught: Spring 2023

Learning Outcomes: 1. Implement research project under supervision of thesis mentor

Audience: Undergraduate

2. Understand outcomes of statistical analysis or research data

Audience: Undergraduate

3. Report on scientific honors research through divers means of communication

Audience: Undergraduate

4. Demonstrate excellent reading, writing, communication, and research skills

Audience: Undergraduate

AN SCI 699 – SPECIAL PROBLEMS

1-3 credits.

Individual advanced work in an area of Animal Sciences under the direct guidance of a faculty member.

Requisites: Consent of instructor

Course Designation: Level - Advanced

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Repeatable for Credit: Yes, unlimited number of completions

Last Taught: Spring 2025

Learning Outcomes: 1. Integrate and apply knowledge to understand issues associated with in Animal industries or associated with animal scientific research

Audience: Undergraduate

2. Report findings through divers means of communication

Audience: Undergraduate

3. Develop and illustrate specialize skills relevant to a focused body of work associated with a specific learning experience

Audience: Undergraduate

4. Summarize intellectual growth associate with independent study work

Audience: Undergraduate

AN SCI/FOOD SCI 710 – CHEMISTRY OF THE FOOD LIPIDS

2 credits.

Chemical constitution, structures, reactions, stereochemistry of fats, phospholipids, related compounds; methods of isolation, characterization; synthesis; relation of structure to physical properties.

Requisites: Graduate/professional standing

Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement

Repeatable for Credit: No

Last Taught: Fall 2021

Learning Outcomes: 1. Write a clear and concise research paper
Audience: Graduate

2. Improve oral communication by presenting major points of the research paper
Audience: Graduate

3. Utilize software to illustrate a protein containing a bound lipid at atomic resolution.
Audience: Graduate

4. Explain lipid functions in relation to varying environmental conditions and electron transfer reactions
Audience: Graduate

5. Develop a detailed understanding of lipid analysis, lipid synthesis as well as digestion and transport of dietary lipids in different vertebrates.
Audience: Graduate

6. Derive the likely volatiles to be generated during storage of any unsaturated fatty acid using the beta-scission of a linoleic acid hydroperoxide as a template
Audience: Graduate

7. Determine if a given reaction is thermodynamically favorable based on standard one-electron reduction potentials and concentrations of reactants (oxidized/reduced couples)
Audience: Graduate

AN SCI/FOOD SCI 711 – FOOD BIOCHEMISTRY

3 credits.

Explores methods for interrogating structure-function relationships, molecular profiles, and microstructure of foods. Provides hands-on experience using computational approaches to model protein-small molecule interactions, analysis of small molecules using high-resolution MS, and protein composition and morphology with fluorescence spectroscopy and microscopy. Knowledge of food chemistry or organic chemistry (such as FOOD SCI 410, CHEM 341, 343, or 345) required.

Requisites: Graduate/professional standing

Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement

Repeatable for Credit: No

Last Taught: Fall 2024

Learning Outcomes: 1. Critically evaluate recent literature in the field of food chemistry
Audience: Graduate

2. Illustrate the interactions between food molecules (lipids, protein, carbohydrates, bioactive) at atomic resolution using software.
Audience: Graduate

3. Analyze and differentiate the molecular composition of a food or ingredient using HPLC-MS/MS data; fluorescence spectroscopy; and microscopy
Audience: Graduate

4. Propose and analyze how reactions and physical changes affect food microstructure and composition
Audience: Graduate

AN SCI 799 – PRACTICUM IN ANIMAL SCIENCES TEACHING

1-3 credits.

Instructional orientation to teaching at the higher education level in the agricultural and life sciences, direct teaching experience under faculty supervision, experience in testing and evaluation of students, and the analysis of teaching performance.

Requisites: Consent of instructor

Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement

Repeatable for Credit: No

Last Taught: Summer 2025

Learning Outcomes: 1. articulate learning goals of the practicum separately from the main educational goals of the course in which the practicum takes place;

Audience: Graduate

2. gain experience in creating, revising, critiquing course syllabi, that is, get firsthand experience in developing course requirements and policies

Audience: Graduate

3. develop a strategy process to align course materials and course assignments with course objectives.

Audience: Graduate

4. practice teaching under distinct instructional modalities; lecture vs discussion vs labs; synchronous vs asynchronous remote instruction

Audience: Graduate

5. prepare and implement lesson plans of a class period, a week of instruction, or a module of the class

Audience: Graduate

6. acquire classroom management skills including how to deliver content, lead a discussion, handle questions and answers

Audience: Graduate

7. develop both formative and summative evaluation instruments to gain feedback on how to assess and improve the teaching and learning process

Audience: Graduate

AN SCI/DY SCI 824 – RUMINANT NUTRITIONAL PHYSIOLOGY I

4 credits.

Focuses on rumen microbiology, metabolite modeling, as well as protein and VFA nutrition and metabolism.

Requisites: Graduate/professional standing

Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement

Repeatable for Credit: No

Last Taught: Fall 2024

Learning Outcomes: 1. Assess source, digestion, absorption, utilization, and metabolism of nutrients in ruminants

Audience: Graduate

2. Integrate concepts of carbon and nitrogen tracing and flux through ruminant body systems

Audience: Graduate

3. Develop a command of modeling nutrient flux through tissues and be able to apply and extrapolate concepts to nutrient utilization and tracing methodology

Audience: Graduate

4. Clearly communicate the conceptual basis, assumptions, and limitations of techniques and methodology necessary to quantify digestive and metabolic processes

Audience: Graduate

5. Evaluate nutritional recommendations and current topics in ruminant nutrition

Audience: Graduate

AN SCI/DY SCI 825 – RUMINANT NUTRITIONAL PHYSIOLOGY II
4 credits.

Focuses on calf and heifer nutrition, regulation of dry matter intake, plant and forage chemistry, vitamins, lipids, and starch.

Requisites: Graduate/professional standing

Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement

Repeatable for Credit: No

Last Taught: Fall 2023

Learning Outcomes: 1. Assess source, digestion, absorption, utilization, and metabolism of nutrients in ruminants

Audience: Graduate

2. Integrate concepts of carbon and nitrogen tracing and flux through ruminant body systems

Audience: Graduate

3. Develop a command of modeling nutrient flux through tissues and be able to apply and extrapolate concepts to nutrient utilization and tracing methodology

Audience: Graduate

4. Clearly communicate the conceptual basis, assumptions, and limitations of techniques and methodology necessary to quantify digestive and metabolic processes

Audience: Graduate

5. Evaluate nutritional recommendations and current topics in ruminant nutrition

Audience: Graduate

AN SCI/GENETICS/POP HLTH 849 – GENOMIC EPIDEMIOLOGY
2 credits.

An introduction to genomic epidemiology, including a general overview of genetics and Mendelian and complex inheritance, as well as various elements of study design, such as participant ascertainment; phenotype definition; biologic sample selection; genotyping, sequencing, and quality control; measurement of covariates; and choice of analytic methods. Briefly covers original study designs; focuses on current study designs.

Requisites: Graduate/professional standing

Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement

Repeatable for Credit: No

Last Taught: Spring 2024

Learning Outcomes: 1. Evaluate and discuss genetic/genomic epidemiological literature.

Audience: Graduate

2. Design simple genetic/genomic epidemiological studies.

Audience: Graduate

3. Identify and apply appropriate tests of association between genetic variants and both qualitative and quantitative outcomes using either unrelated individuals or families.

Audience: Graduate

4. Summarize and interpret the results of genetic/genomic tests of association.

Audience: Graduate

AN SCI 865 – DESIGN AND ANALYSIS OF BIOLOGICAL STUDIES

4 credits.

Experimental design and proper data analysis are critical processes for scientific research. Planning and performing research studies have statistical implications that influence how results are interpreted. Learn the fundamentals of generalized linear models, experimental design, and data analysis using common examples from biological studies.

Requisites: Graduate/professional standing

Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement

Repeatable for Credit: No

Last Taught: Spring 2025

Learning Outcomes: 1. Use regression models properly

Audience: Graduate

2. Select the most appropriate experimental design for a particular experiment

Audience: Graduate

3. Select the most appropriate method of data analysis

Audience: Graduate

4. Determine the most appropriate model that fits the data

Audience: Graduate

5. Interpret the results of the data analysis

Audience: Graduate

6. Use the statistical software R to analyze data

Audience: Graduate

AN SCI 875 – SPECIAL TOPICS

1-4 credits.

Specialized subject matter of current interest to graduate students.

Requisites: Graduate/professional standing

Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement

Repeatable for Credit: Yes, unlimited number of completions

Last Taught: Spring 2025

Learning Outcomes: 1. Analyze and critique research results, interpretations and proposals.

Audience: Graduate

2. Demonstrate critical thinking and knowledge about the significance of current research in the fields of animal and dairy science by presenting and/or critiquing scientific presentations

Audience: Graduate

AN SCI/DY SCI 931 – SEMINAR IN ANIMAL NUTRITION

1 credit.

Discussion of literature that has a bearing on animal nutrition. Students are to survey the literature and present a seminar.

Requisites: Graduate/professional standing

Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement

Repeatable for Credit: Yes, unlimited number of completions

Last Taught: Spring 2024

AN SCI/DY SCI/GENETICS 951 – SEMINAR IN ANIMAL BREEDING

0-1 credits.

Requisites: Graduate/professional standing

Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement

Repeatable for Credit: No

Last Taught: Spring 2020

AN SCI/OBS&GYN/ZOOLOGY 954 – SEMINAR IN ENDOCRINOLOGY-REPRODUCTIVE PHYSIOLOGY

0-1 credits.

Promotes scientific and professional development. Presenters develop and deliver research presentations to a scientific audience, field questions, and receive critiques about their presentation style and scientific approach. Additional presentations include professional development, career advancement opportunities, and topics of interest to the endocrinology and reproduction community at large.

Requisites: Graduate/professional standing

Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement

Repeatable for Credit: Yes, unlimited number of completions

Last Taught: Spring 2025

Learning Outcomes: 1. Demonstrate knowledge of cutting-edge research in and related to one's research area through the development and delivery of research presentations

Audience: Graduate

2. Communicate complex ideas in research presentations and questions in a clear and understandable manner

Audience: Graduate

3. Evaluate presentations and providing effective feedback

Audience: Graduate

AN SCI 990 – RESEARCH

1-12 credits.

Independent research in preparation of a graduate thesis under supervision of a faculty member.

Requisites: Consent of instructor

Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement

Repeatable for Credit: Yes, unlimited number of completions

Last Taught: Summer 2025