ANIMAL SCIENCE (ANSC)

ANSC 1101 - Contemporary Perspectives in Animal Science (1 Credit)
This course offers an opportunity for incoming students to gain an appreciation for the range of issues and topics available in the Animal Science major. Faculty will present their current research and outreach activity as a means to engage students in current issues and to introduce possibilities for future research experience.
Enrollment Information: Enrollment preference given to: first-year and transfer students.
Last Four Terms Offered: Fall 2024, Spring 2024, Spring 2023, Fall 2021
Learning Outcomes:

- Identify research topics in Animal Science.
- Explain the breadth of contemporary issues in Animal Science.
- Investigate student opportunities such as student research, internships, and student organizations.

Schedule of Classes (https://classes.cornell.edu/)

ANSC 1105 - Careers in Animal Science (1-2 Credits)
In addition to preparing students for veterinary medicine, a degree in Animal Science is excellent background for careers in agricultural production, education, marketing, communications, and policy development, in both private and public sectors. In this course, students explore these opportunities and develop professional skills that will aid them in career planning.
Enrollment Information: Enrollment preference given to: first-year and transfer students.
Last Four Terms Offered: Spring 2025, Fall 2023, Fall 2022, Spring 2022
Learning Outcomes:

- Identify careers in the animal science field.
- Create a professional resume.
- Develop a course plan to ensure academic success.

Schedule of Classes (https://classes.cornell.edu/)

ANSC 1120 - Sustainable Animal Husbandry (3 Credits)
Students completing this course will explore the many roles of domestic animals and the importance of their interdependence with humans as they interview a farmer of their choice, synthesize a viewpoint to represent a topic in sustainability, tour a variety of farms, and discuss a sampling of current animal research topics with animal science faculty visitors. Topics include: domestication, sustainability, companion animals, sheep, goats, swine, beef cattle, dairy cattle, nutrition, genetics, grazing, dairy products, poultry, horses, Third World limited-resource animal systems, and lab animals.
Distribution Requirements: (AFS-AG, SCH-AG)
Exploratory Studies: (CU-SBY)

Last Four Terms Offered: Summer 2025, Winter 2025, Summer 2024, Winter 2024
Learning Outcomes:

- Students will compare and contrast various domestic animal production systems.
- Students will apply basic knowledge of animal nutrition, genetics, reproduction, and physiology to domestic animal species.
- Students will practice proper handling of livestock, particularly sheep and horses.
- Students will use the Cornell library resources to research and critique various perspectives of issues related to sustainable domestic animal production systems using scientific journal articles.
- Students will produce a researched outline in order to appreciate the multiple perspectives of a given agricultural issue of interest in sustainable agriculture.
- Students will exchange scientific ideas with classmates during an in-class debate.

Schedule of Classes (https://classes.cornell.edu/)

ANSC 1130 - Introduction to Captive Raptor Husbandry (1 Credit)
This course will provide students with an introduction to captive raptor management. The course structure will include a weekly classroom lecture and a complementary hands-on laboratory training session utilizing resident birds of prey and facilities of the Cornell Raptor Program. Topics of instruction will include natural history and adaptations of various bird of prey species, safe handling of captive raptors, nutritional requirements, health care, behavior and training, and the ethics of maintaining captive raptors. Course will include animal handling and chores related to raptor care.
Enrollment Information: Enrollment limited to: first-year and sophomore students, or permission of instructor.
Last Four Terms Offered: Fall 2024, Fall 2023, Fall 2022, Summer 2022
Learning Outcomes:

- Communicate basic knowledge of physiology and North American species, adaptations, physiology, habitat, and conservation status.
- Demonstrate and communicate the safe handling of birds of prey to minimize stress and potential injury to the bird and injury to the handler.
- Use behavioral cues and basic gear in the capture, restraint, and handling of birds of prey.
- Implement feeding strategies using basic nutritional requirements of birds of prey and management of nutrition and basic health care in captivity.
- Communicate ethical concerns and debates in maintaining captive birds of prey.
- Work efficiently and effectively in a group as a team member with equal contribution towards required material.
- Demonstrate an openness and respect for diverse backgrounds, opinions, and experiences towards subject matter.

Schedule of Classes (https://classes.cornell.edu/)

ANSC 1200 - Contemporary Dairy Industry Topics and Issues (1 Credit)
This course is designed to expose students to current topics and issues in the U.S. and global dairy industry to create awareness and provide opportunities for developing critical thinking skills in problem solving related to dairy food production.
Enrollment Information: Enrollment limited to: first-year or transfer students with an interest in the dairy industry and the Dairy Fellows Program at Cornell.
Exploratory Studies: (CU-SBY)

Last Four Terms Offered: Fall 2024, Fall 2023, Fall 2022, Fall 2021
Learning Outcomes:

- Discuss current topics and issues relevant to the dairy industry.
- Evaluate current topics and issues in the dairy industry as business opportunities and areas for growth.
- Analyze various aspects of dairy food production from an environmental, financial and ethical perspective.
- Use the concept of a SWOT (strengths, weaknesses, opportunities and threats) analysis to evaluate opportunities in the dairy field.

Schedule of Classes (https://classes.cornell.edu/)

ANSC 1205 - Current Dairy Topics Explored Through Writing (3 Credits)
This course is designed to allow students to explore the dairy industry through the written word and as part of the course students will practice applied writing using the dairy industry as a mode to improve writing skills. Aimed for undergraduates who have a sincere interest in the dairy industry and the objective is to provide practical writing assignments to help prepare students for careers in the dairy industry. Assignments will range from analytical essays and grant writing to op-ed interviews of dairy scientists which will encourage students to develop their own unique voice while engaging with pressing dairy industry topics.
Enrollment Information: Enrollment preference given to: students intending to concentrate in Dairy Management as part of the Animal Science major.
Distribution Requirements: (WRT-AG)
Learning Outcomes:

- Evaluate personal perspectives and experiences with the dairy industry.
- Debate and evaluate scientific sources.
- Develop a grant proposal to the State of New York or USDA for funds to address this issue.
- Prepare and conduct an interview of a dairy scientist.
- Critique and analyze the contemporary issues in the dairy industry.

Schedule of Classes (https://classes.cornell.edu/)

ANSC 1249 - Applied Dairy and Food Production (0.5 Credits)
This 7-week fall course prepares students for a faculty-led winter study trip within the United States to explore dairy and food production. Students will spend the class sessions gaining familiarity with domestic food production and challenges in the region to be visited using readings, lectures, and in-class discussions. Upon completion of the fall course, students then enroll in 1.5 practicum hours of winter session credits, where they travel to meet with producers and ag businesses who are actively engaged in food production.
Enrollment Information: Enrollment preference given to: Animal Science and Agriculture Science students with interest in dairy.
Exploratory Studies: (CU-CEL)

Learning Outcomes:

- Describe and critically evaluate the current state of food production in the region of interest.
- Compare the agricultural production practices and food production of the region of interest with the common production practices of the northeast.
- Recognize and identify resource limitations, both human and natural, in the region of interest.

Schedule of Classes (https://classes.cornell.edu/)

ANSC 1250 - Applied Dairy and Food Production Field Experience (1.5 Credits)
This is the faculty-led winter study trip that follows a 0.5 credit Fall course where students gain familiarity with a production region of interest within the United States. The objective of this study trip is to expose students to the variety and scale of food production in the United States. Students participating in this course will engage, through tours and conversations, with a wide range of agricultural businesses. In addition, there will be working dinners and lunches where students will meet and interact with CALS alumni and other industry leaders and professionals in the region.
Course Fee: Field Trip Fee, $1600. Estimated fee.
Exploratory Studies: (CU-CEL, CU-SBY)

Last Four Terms Offered: Winter 2024
Learning Outcomes:

- Compare the scale of agriculture and food production you are familiar with compared to what you observe and articulate the potential benefits and pitfalls of both systems.
- Demonstrate cultural sensitivity and understanding by engaging respectfully with people from diverse backgrounds.
- Determine and critique the human resources and capital costs required to allow this region to produce the quantity of food grown in this region compared to what you are familiar with.
- Assess the use of natural resources, how they are managed and who should have rights to them.

Schedule of Classes (https://classes.cornell.edu/)

ANSC 1400 - Wool: Animal Fiber Production and Processing (1 Credit)
Last Four Terms Offered: Spring 2025, Spring 2024
Schedule of Classes (https://classes.cornell.edu/)

ANSC 1500 - Biology of Cats and Dogs: No Woof and Meow About It (3 Credits)
This course introduces students to core principles of animal biology through cat and dog evolution, domestication, genetics, and physiology. We'll discuss how dogs and cats evolved in divergent ways, shaping adaptation to human environments. We'll explore the quirky world of feline and canine genetics and uncover why dogs display incredible diversity in size and shape, including maladaptive morphology or deleterious mutations associated with breeding. Species-specific adaptations influencing reproductive and physical traits, such as dogs' exceptional scent perception and feline reproduction, the most efficient among placental carnivorans, will be discussed. This course blends lectures, interactive discussions, and student-led case studies, encouraging students to apply knowledge to real-world scenarios. Designed for non-life sciences majors, this class offers a fun, accessible way to explore the fascinating biology behind our favorite four-legged companions.
Enrollment Information: Not open to: Animal Science students.
Distribution Requirements: (BIO-AG, BSC-AG, OPHLS-AG)
Last Four Terms Offered: Fall 2024, Summer 2024, Fall 2023
Learning Outcomes:

- Apply fundamental principles of inheritance to evaluate how selective breeding impacts the health and genetic diversity of cats and dogs.
- Compare and contrast key physiological systems in cats and dogs.
- Compare and contrast developmental milestones and life stages in cats and dogs.
- Explain the biological and evolutionary factors contributing to differences in reproductive strategies and success between cats and dogs.
- Construct evidence-based arguments addressing controversial topics related to cat and dog evolution, genetics, and welfare (e.g., selective breeding practices, vegan diets, neutering, declawing, debarking, tail docking, and feral population management).

Schedule of Classes (https://classes.cornell.edu/)

ANSC 2000 - Sustainable Food and Companion Animal Systems and Perspectives (3 Credits)
This course offers students a broad view of biological, environmental, and social aspects of various animal systems for sustainable food production, economic development, and human companionship in the US and world. The mission, importance, status, and challenges of the milk, meat, egg, and fish production systems will be covered. It will also introduce the rapidly increasing ownership of horses and pets and assess their impacts on life quality and mental health of the public, global food security, and anthropogenic contribution to climate change. Integrations of scientific breakthrough, technology innovation, and societal and behavioral transformation will be explored to enhance the efficiency and environmental compatibility of various animal systems.
Prerequisites: introductory level course in biology or animal science.
Distribution Requirements: (AFS-AG, SCH-AG)
Exploratory Studies: (CU-SBY)

Last Four Terms Offered: Spring 2023, Spring 2022
Learning Outcomes:
- Understand the roles and importance of various animal systems in providing the global and local communities with milk, meat, eggs, fish, co-products, recreation, and companionship.
- Identify and analyze the major biological, economic, environmental, and social challenges and issues of the animal systems facing the US and the world.
- Reveal origins and reasons of the problems hindering sustainable animal systems and propose effective and feasible solutions for overcoming these obstacles.
- Evaluate various predictions of regional and global demands and impacts of the animal sourced-foods and pets.

Schedule of Classes (https://classes.cornell.edu/)

ANSC 2100 - Practical Large Animal Handling (1 Credit)
The course will introduce students to the fundamental principles of handling and restraint including basic veterinary techniques pertaining to horses, beef and dairy cattle, swine, sheep, and poultry. Topics include basic animal anatomy and physiology, identifying breeds of various large animal species, breeding techniques, and general husbandry and management practices. This course is designed to enhance the large animal handling skills of animal science students.
Prerequisites: BIOAP 1100 or equivalent.
Enrollment Information: Enrollment limited to: first-year and sophomores students, or permission of instructor.
Last Four Terms Offered: Spring 2025, Spring 2024, Spring 2023, Spring 2022
Learning Outcomes:
- Explain the basics of large animal husbandry and management practices.
- Implement large animal handling and restraint techniques safely with various species, including horses, sheep, dairy and beef cattle, chickens and pigs.
- Apply material learned in class to hands-on experience working with and caring for large animals.

Schedule of Classes (https://classes.cornell.edu/)

ANSC 2120 - Animal Nutrition (4 Credits)
Introduction to animal nutrition, including digestive physiology and metabolism of domestic animals and other species, nutrient properties and requirements for different aspects of animal production and performance, and principles of feed evaluation and ration formulation. Laboratory classes include gastrointestinal tract dissections and nutritional experiments performed on laboratory or farm animal species.
Prerequisites: CHEM 1560 or equivalent.
Distribution Requirements: (OPHLS-AG)
Last Four Terms Offered: Fall 2024, Fall 2023, Fall 2022, Fall 2021
Learning Outcomes:
- Explain the principles of mammalian nutrition, including digestive physiology and metabolism.
- Determine basic nutrient requirements of livestock and other animal species, and how to meet those needs.
- Conduct animal nutritional experiments, collect and analyze data, and present results in oral and written formats.

Schedule of Classes (https://classes.cornell.edu/)

ANSC 2170 - Public Communication in Animal Science (1 Credit)
This course provides students an opportunity to enhance public literacy of animal agriculture using social media. Students will work as a team to (i) assess community gaps in knowledge of animal production through social media research and public community survey, (ii) interview animal scientists, farmers, or others within livestock industries to hear their perspective, (iii) develop a written narrative to provide scientific knowledge and clarity to a diverse community audience, (iv) critique their narration to identify potentially controversial dialogue and refine as necessary to ensure their communication is evidence-based, (v) audio record and edit their finalized narrative and integrate with pre-recorded interviews to create a Ruminate On This podcast episode, and (vi) develop alternative social media content (e.g., Twitter) to support their public engagement.
Prerequisites: one semester of undergraduate biology (e.g., BIOMG 1350, BIOG 1440, or BIOG 1445).
Last Four Terms Offered: Fall 2024, Fall 2023, Fall 2022
Learning Outcomes:
- Utilize survey tools and personal engagement to acquire an understanding of the public perception of domestic animal production including alternative perspectives.
- Develop an ability to utilize science-based evidence to provide the public with accurate scientific information and address misconceptions.
- Effectively utilize written and oral communication of animal science to convey an important scientific message and improve animal science literacy to a diverse public audience.
- Identify our own gaps in knowledge and personal bias that has the potential to influence public-science dialogue.

Schedule of Classes (https://classes.cornell.edu/)

ANSC 2210 - Principles of Animal Genetics (4 Credits)
This course focuses on the genetic foundation and improvement of domestic species. Basic cellular biology and DNA replication will lay the groundwork for understanding the genetic mechanisms underlying traits, modern genomic tool development, and analysis methods. Critical thinking towards animal breeding and management will require an understanding of heritability, population dynamics, rate of selection, and genetic and economic gain. Software and reference programs will be used to investigate animal genes and genomes, individual genotypes through DNA sequence or whole-genome marker panels, and statistical associations between traits and genetic markers. Modern examples, practical applications, and hands-on tools will be key components of this class in order to appreciate the intricacies of genetics and the future of genomic research for the improvement and management of animals.
Prerequisites: two semesters of college-level biology.
Distribution Requirements: (BSC-AG, OPHLS-AG)
Last Four Terms Offered: Spring 2025, Spring 2024, Spring 2023, Spring 2022
Learning Outcomes:

- Explain basic genetic principles including DNA replication and mutations, Mendelian inheritance, codominance, epistatis, and complex traits and how these factors effect phenotypic traits.
- Interpret modern genotyping techniques, data generated, and analytical methods to critically evaluate research and identify significant details, research integrity, and outcomes.
- Critically evaluate a population for decision making by calculating genotype and allele frequencies and using factors such as inbreeding, hybrid vigor, effective population size, and genetic drift as guidance.
- Evaluate the pros and cons of selection schemes for implementing genetic improvement in livestock and domestic animals.
- Apply genetic principles towards the improvement of the health and production of livestock and domestic animals.

Schedule of Classes (https://classes.cornell.edu/)

ANSC 2300 - Introduction to Domestic Mammalian Behavior (2 Credits)
An introduction to the behavior of domestic mammals and how behavior relates to management and welfare. Course explores both normal and abnormal behavior of farm and companion animal species. Some discussion of how these behaviors relate to animal welfare is involved but behavior, its development, and it purpose within and across species, is the main focus.
Prerequisites: BIOAP 1100 or permission of instructor.
Last Four Terms Offered: Fall 2024, Fall 2023, Fall 2022, Fall 2021
Learning Outcomes:

- Summarize and compare categories of behavior (e.g. maternal behavior) between species, noting similarities and differences as well as proposing potential costs and benefits of the behavior(s).
- Recognize and define "problem behaviors" and suggest potential causes and solutions for the behavior.
- Articulate general concepts related to mammalian behavior and the study of mammalian behavior.
- Critically evaluate peer-reviewed scientific articles by effectively reading, understanding, and analyzing the authors' findings and conclusions.

Schedule of Classes (https://classes.cornell.edu/)

ANSC 2400 - Biology of Reproduction (3 Credits)
Comparative anatomy and physiology of mammalian and avian reproduction, with emphasis on domestic and laboratory animals; fertilization through embryonic development, pregnancy, and growth to sexual maturity; emphasis on physiological mechanisms and application to fertility regulation. Separate laboratory is offered to demonstrate fundamental aspects of reproduction and reproductive technology.
Prerequisites: BIOAP 1100 or two semesters of college-level biology.
Distribution Requirements: (OPHLS-AG)
Last Four Terms Offered: Spring 2025, Spring 2024, Spring 2023, Spring 2022
Learning Outcomes:

- Describe the form and major functions of reproductive structures in male and females.
- Explain the neuroendocrine regulation of reproductive function and the endocrine function and regulation of the testis and ovary.
- Explain the production and function of male and female germ cells and their interactions required for fertilization.
- Describe early embryonic development, recognition of pregnancy, placentation, and parturition.
- Compare specie-specific differences in various aspects of reproductive form and function.
- Explain the physiological basis for reproductive technologies such as estrous cycle regulation, gamete and embryo preservation and transfer, in vitro fertilization, and pregnancy diagnosis.
- Summarize and communicate scientific data from the primary literature on reproductive biology.

Schedule of Classes (https://classes.cornell.edu/)

ANSC 2410 - Biology of Reproduction Lab (1 Credit)
Demonstrates fundamental principles and applied aspects of mammalian and avian reproduction. A limited number of live animals are used in some demonstrations. Dissection and examination of tissues from vertebrate animals are included in selected laboratories.
Prerequisites: Prerequisite or corequisite: ANSC 2400.
Distribution Requirements: (OPHLS-AG)
Last Four Terms Offered: Spring 2025, Spring 2024, Spring 2023, Spring 2022
Learning Outcomes:

- Describe the comparative functional reproductive anatomy and histology across a range of domestic and companion animals, wildlife species, and humans.
- Describe endocrine organs and tissues and relate their developmental and functional influence on reproductive structure and function.
- Explain the developmental, structural, and physiological changes in male and female germ cells required for gamete transport, fertilization, and early embryo development.
- Evaluate the basis for reproductive technologies and their potential impact on genetic improvement, reproductive efficiency, and species conservation.
- Explain fundamental cryobiological principles as they relate to cryopreservation of gametes, embryos, and somatic tissues for subsequent use in a broad range of reproductive technologies.
- Compare species differences in placental development and function and relate differences to support of embryo and fetal development and mechanisms of parturition.

Schedule of Classes (https://classes.cornell.edu/)

ANSC 2500 - Dairy Cattle Principles (3 Credits)
Introduction to the background and scientific principles relating to dairy cattle production. Laboratories are designed to provide an understanding of dairy cattle production.
Distribution Requirements: (AFS-AG)
Exploratory Studies: (CU-SBY)

Last Four Terms Offered: Fall 2024, Fall 2023, Spring 2022, Spring 2021
Learning Outcomes:

- Summarize and evaluate the common practices of dairy production in the United States.
- Articulate and appraise common social and ethical influences that steer the dairy industry.
- Discuss common and current economic conditions on dairy farms in the USA and globally as a mechanism to understand and evaluate how global events shape modern dairy production.

Schedule of Classes (https://classes.cornell.edu/)

ANSC 2550 - Dairy Study Trip to Italy (0.5 Credits)
In this first course, students will be introduced to the Italian dairy industry, the various cheeses produced in the country and the culture around the cheese related to the region of production.
Enrollment Information: Enrollment preference given to: first-year, sophomore and transfer students in Animal Science/Dairy Management.
Course Fee: Course Fee, $1780. Fee amount approximate, $1420.00 or $1,780.00, depending on meal choice.
Exploratory Studies: (CU-ITL)

Last Four Terms Offered: Fall 2024, Fall 2022, Fall 2019, Fall 2017
Learning Outcomes:

- Identify and assess various cheeses and describe how they are made and why they are different.
- Describe and compare cheese making techniques from different regions.
- Compare and contrast the regional protection mechanisms in place for various foods and wines in Italy and how that impacts regional and global marketing and production.
- Use historical and regional knowledge to develop a travel itinerary.
- Converse at a basic level in Italian.

Schedule of Classes (https://classes.cornell.edu/)

ANSC 2551 - Dairy Study Trip to Italy II (0.5 Credits)
This second part of the course sequence is an intensive study trip designed for exposure to a variety of dairy related agricultural production approaches in diverse regions of Italy. Topics will include: dairy management, profitability, and the role of culture as it relates to regional cheese production.
Prerequisites: ANSC 2550.
Exploratory Studies: (CU-ITL, CU-SBY)

Last Four Terms Offered: Winter 2025, Winter 2023, Winter 2020, Spring 2018
Learning Outcomes:

- Describe Italian milk production, cheese production and consumer expectations and compare this to the U.S. perspective on artisanal and local food production.
- Assess and explain resource limitations for dairy production systems in the Italian agricultural system and provide context for that relative to future food production.
- Critique the Italian food production systems and contrast what they observe and learn with the U.S. system.
- Integrate the economics and conditions surrounding milk production and consumer expectations and compare this to the U.S.
- Evaluate EU regulations for CAFO/manure nitrogen and phosphorous and understand how it might differ from the U.S. approach.
- Determine how Italians approach financial decision-making and cost of production.

Schedule of Classes (https://classes.cornell.edu/)

ANSC 2552 - Dairy Study Trip to Italy III (0.5 Credits)
This final course of the three-part sequence is designed to reflect on the intensive study trip designed for exposure to a variety of dairy related agricultural production approaches in diverse regions of Italy.
Prerequisites: ANSC 2550 and ANSC 2551.
Exploratory Studies: (CU-SBY)

Last Four Terms Offered: Spring 2025, Spring 2023, Spring 2020
Learning Outcomes:

- Students will be able to differentiate Italian milk production, cheese production, and consumer expectations and compare this to the U.S. perspective on artisanal and local food production.
- Students will assess and explain resource limitations for dairy production systems in the Italian agricultural system and provide context for that relative to future food production.
- Students will critique the Italian food production systems and contrast what they observe and learn with the U.S. system.
- Students will be able to integrate the economics and conditions surrounding milk production and consumer expectations and compare this to the U.S.
- Evaluate EU regulations for CAFO/manure nitrogen and phosphorous and understand how it might differ from the U.S. approach.
- Determine how Italians approach financial decision-making and cost of production.

Schedule of Classes (https://classes.cornell.edu/)

ANSC 2650 - Equine Biology and Management (3 Credits)
Provides the basics of equine form, function, care, management, and handling. Students learn the basic biology of the horse and how to apply this knowledge to solve problems in horse care. Hands-on labs include safe handling techniques, basic groundwork, applied anatomy, and more. Short trips and tours illustrate applied concepts in the horse industry and equine health care.
Prerequisites: BIOAP 1100 or permission of instructor.
Distribution Requirements: (OPHLS-AG)
Last Four Terms Offered: Fall 2024, Fall 2023, Fall 2022, Fall 2021
Learning Outcomes:

- Explain the basics of horse husbandry and use this information to formulate equine management decisions.
- Apply their knowledge of equine anatomy and physiology to management practices and equine health and disease.
- Gather and critically evaluate information to: understand and make decisions regarding horse care; present this information and make recommendations to peers and a lay audience.
- Demonstrate comfort and skill while handling and working with horses.

Schedule of Classes (https://classes.cornell.edu/)

ANSC 3000 - Avian Physiology and Management (3 Credits)
This course covers avian evolution and taxonomy, behavior, husbandry, and major physiological systems (e.g., skeletal, digestive, reproductive). Lecture material is reinforced with anatomical software and pigeon dissection lab. Use of avian model organisms in research is explored through study of scientific literature. Additional lectures explain the unique characteristics and management of different domesticated and exotic avian species. Students gain hands-on experience managing agricultural waterfowl through fieldtrips and the Morrison's Fowl Farm component of the course. Over the course of ten weeks, students perform chores and raise ducklings from two different breeds of duck selected for meat production. Students collect and analyze data for use in a final written research project in which they compare growth rate, carcass weight, and profitability of the two breeds.
Prerequisites: one semester of general biology or physiology.
Distribution Requirements: (BSC-AG, OPHLS-AG)
Last Four Terms Offered: Fall 2024, Fall 2023
Learning Outcomes:

- Identify the major bones and muscles of the avian musculoskeletal system.
- Describe the anatomy and types of feathers and physical adaptations for flight.
- Identify the major organs of the reproductive, digestive, and excretory systems and describe their functions.
- Describe the techniques used in the husbandry and management of different species of birds.
- Use avian husbandry practices to care for and manage domesticated ducks.
- Compare and contrast unique adaptations, behaviors, and physiologies among the species covered.
- Collect and analyze data, interpret results, and communicate findings in a written report.

Schedule of Classes (https://classes.cornell.edu/)

ANSC 3100 - Animal Welfare (3 Credits)
This course will cover the basic principles, history, and application of animal welfare science for multiple species. Students will learn to assess the welfare of animals in a variety of settings using science-based methods and reasoning. The objective of this course is to provide students with a background in and ability to apply principles of animal welfare science, which will facilitate their ability to successfully engage in welfare deliberations.
Prerequisites: one semester of college level Biology (BIOAP 1100 or equivalent), animal management (ANSC 2100 or equivalent) or animal behaviors/ethics.
Last Four Terms Offered: Spring 2025, Fall 2023, Fall 2022, Fall 2021
Learning Outcomes:

- Explain and apply common definitions and applications of animal welfare.
- Assess animal welfare using animal behavior, physiology, and other evidence-based measures.
- Assess legislation, public policy, and assurance programs related to animal welfare.
- Obtain, critically evaluate, summarize, and synthesize scientific literature related to animal welfare science.
- Identify and describe interacting factors that can support or constrain sustainability as it relates to animal welfare.

Schedule of Classes (https://classes.cornell.edu/)

ANSC 3300 - Fish Physiology (3 Credits)
Crosslisted with BIOAP 3300
Fish Physiology is an introduction to the functional biology of fish. Lecture topics will cover cellular and tissue function within key physiological systems that help fish thrive in a wide range of aquatic habitats, from mountain streams to deep-sea vents. These systems will be illustrated using a diverse variety of fish, while broader comparisons between fish and higher vertebrates will also be drawn. Discussion will integrate aquaculture, fisheries, and environmental contexts, including some of the anthropogenic challenges that fish face today and what can be done to mitigate them. Students will perform a gross dissection to identify anatomy in situ and visit an aquaculture facility (there is no separate lab section).
Prerequisites: one semester of introductory animal physiology (BIOAP 1100, BIOG 1440, BIOG 1445 or equivalent), or permission of instructor.
Distribution Requirements: (OPHLS-AG)
Exploratory Studies: (CU-SBY)

Last Four Terms Offered: Spring 2025, Spring 2024, Spring 2023, Spring 2022
Learning Outcomes:

- Characterize various physiological systems that fish use to live in an aquatic environment.
- Describe how these systems adjust to environmental changes in the short and long term.
- Explain physiological differences between groups of fishes.
- Explain how physiological systems in fish may be similar to, differ from, or have evolved into those in terrestrial vertebrates.
- Discuss how unsustainable resource management and human perturbations in the environment affect fish at the physiological level.

Schedule of Classes (https://classes.cornell.edu/)

ANSC 3310 - Applied Dairy Cattle Genetics (2 Credits)
Course will review the current knowledge base of dairy cattle genetics including the genetic regulation of diseases, production and health traits. Genomic evaluation scores will be assessed with an emphasis on how to prioritize and balance genetic selection towards long-term sustainability. Mating strategies will be evaluated for the achievement of goals and impact on both the individual animal and overall herd.
Prerequisites: ANSC 2500 and ANSC 2210.
Exploratory Studies: (CU-SBY)

Last Four Terms Offered: Spring 2025, Spring 2023, Spring 2021, Spring 2019
Learning Outcomes:
- Describe how marker assisted selection and heritability measurements are used.
- Critically evaluate dairy cattle evaluation scores: a. Explain how they are produced and weighted.
- Prioritize and balance selection criteria, including both health and production traits, towards species/breed management and long-term sustainability.
- Develop mating strategies to achieve producer goals: a. Predict effect of AI within mating strategies. b. Compare and contrast commercial mating programs. c. Apply mating strategies using genomic selection. d. Predict short and long-term effects on population.

Schedule of Classes (https://classes.cornell.edu/)

ANSC 3400 - Comparative Mammalian Reproduction: The Adaptation of Animals to their Environment (3 Credits)
The course will examine the amazing diversity of reproductive strategies in mammals. Comparative aspects of reproductive physiology will be explored with a focus on the evolution of adaptations and strategies to optimize reproductive success in the face of challenges posed by geographical location and environment. The diversity in basic aspects of reproductive physiology will be highlighted, such as in gonadal function, estrous cycle, pregnancy and lactation. Unique features of species representing the major mammalian orders will be discussed.
Prerequisites: ANSC 2400 or equivalent.
Last Four Terms Offered: Spring 2023, Spring 2022, Spring 2021, Spring 2020
Learning Outcomes:
- Define basic components and mechanisms of reproductive processes in mammals.
- Describe unique features of reproductive processes within given species.
- Illustrate how reproductive strategies employed by a given species represent adaptations to the environment.
- Compare and contrast reproductive strategies employed by closely-related vs distantly-related species.
- Assess the benefits and challenges of reproductive strategies used by a species to adapt to the environment in the modern world.
- Evaluate the primary literature on the reproductive strategies used by groups of mammals and the challenges posed by their environment.

Schedule of Classes (https://classes.cornell.edu/)

ANSC 3410 - Biology of the Mammary Gland in Health and Disease (2 Credits)
Crosslisted with BIOAP 3410
The course uses the mammary gland as the platform to illustrate the integration of physiological systems in the whole animal. Lectures cover the anatomy, development and endocrinology of the gland, composition and biosynthesis of milk and diseases related to mammary gland development and function. The information comes from a variety of mammals including the mouse for development, the dairy cow for production aspects and the human for diseases.
Prerequisites: BIOAP 1100 or introductory course in human or animal physiology.
Distribution Requirements: (OPHLS-AG)
Last Four Terms Offered: Spring 2024, Spring 2022, Spring 2020, Spring 2018
Learning Outcomes:
- List the major anatomical and physiological systems of the mammary gland and articulate how they support the fully functional gland.
- Describe the developmental and regulatory events leading to the formation of a fully functional mammary gland.
- Name the major components of milk and trace their synthesis to specific precursors and biochemical pathways.
- Explain the events leading to diseases associated with mammary development and lactation.
- Evaluate the scientific literature in one area of high interest to mammary gland biology and articulate deeper knowledge of this area through a research proposal.

Schedule of Classes (https://classes.cornell.edu/)

ANSC 3450 - Reproductive Physiology and Management of Dairy Cattle (3 Credits)
This course integrates concepts of reproductive physiology, management, and economics of dairy cattle. Special emphasis is given to practices and technologies currently used in modern dairy operations. Laboratory sessions include hands-on learning of reproductive techniques and dairy herd management software. Concepts discussed in lecture and their respective application include: artificial insemination, rectal palpation and transrectal ultrasonography of the reproductive tract and ovaries, synchronization of estrus and ovulation, blood testing for pregnancy diagnosis, superovulation and embryo transfer, in-vitro fertilization and embryo production.
Prerequisites: ANSC 2400.
Exploratory Studies: (CU-SBY)

Last Four Terms Offered: Spring 2025, Spring 2024, Spring 2023, Spring 2022
Learning Outcomes:

- Integrate basic and complex aspects of reproductive physiology of dairy cattle.
- Illustrate the implications of physiological processes on reproductive management programs and herd performance.
- Design and implement reproductive management strategies to fulfill the specific needs of dairy herds.
- Analyze the reproductive performance of dairy herds using the latest software technologies and provide recommendations to optimize reproductive performance and farm profitability.
- Employ current reproductive technologies used in the dairy industry to maximize herd performance and propagation of cattle of superior genetic value.
- Recognize the value of reproductive biology, management programs, and herd performance on the overall profitability and sustainability of the dairy operation.

Schedule of Classes (https://classes.cornell.edu/)

ANSC 3500 - Meat (3 Credits)
Biology and production of meat and meat products. The emphasis of the course is on the structure and function of muscle, bone, and other tissues as related to the process of converting animals into meat. This will include growth and development, carcass composition, properties of fresh and processed meat, microbiology, preservations, nutritive value, inspection, and sanitation. Lab will include anatomy, meat-animal slaughter, meat cutting, wholesale and retail cut identification, inspection, grading, and cooking. There will be a required half-day field trip to a commercial meat plant.
Prerequisites: introductory animal science and/or biology, or permission of the instructor.
Distribution Requirements: (AFS-AG)
Last Four Terms Offered: Fall 2023, Fall 2022, Fall 2021, Fall 2019
Learning Outcomes:

- Describe procedures and practices for processing animals into meat and meat products.
- Examine ethical and humane animal handling practices.
- Explain methods to ensure high safety and palatability of meat and meat products.
- Identify grading and marketing carcasses and meat.
- Discuss nutritional value and safe handling, storage, and cooking of meat.

Schedule of Classes (https://classes.cornell.edu/)

ANSC 3510 - Dairy Herd Management (4 Credits)
Course integrates concepts of cow biology, management, economics, and sustainability of dairy operations. Special emphasis is given to management practices and technologies that affect cattle health and well-being, milk production and quality, reproduction, herd growth, milking, and environmental impact of dairy production. Basic concepts of dairy foods processing and the importance of milk quality for dairy products are covered. Laboratory sessions include hands-on learning of dairy software, analysis of alternative strategies, and decision-making. Commercial farm case studies are used to integrate concepts of biology and management learned in the course.
Prerequisites: ANSC 2500 or permission of instructor.
Distribution Requirements: (AFS-AG, DLG-AG)
Exploratory Studies: (CU-CEL, CU-SBY)

Last Four Terms Offered: Spring 2025, Spring 2024, Spring 2023, Spring 2022
Learning Outcomes:

- Describe general features and recognize the challenges and opportunities of the global and national dairy industry.
- Understand the breadth and complexity of the biological mechanisms underpinning dairy cattle milk production, health, and reproduction and their implications on herd performance.
- Evaluate the past and present performance of a dairy herd using computer software.
- Recognize the implications of herd management programs and the use of technology on the profitability and sustainability of dairy farms.
- Describe the methods used for milk processing and the manufacture of dairy products and recognize the implications of herd management strategies on the quality and safety of dairy products.

Schedule of Classes (https://classes.cornell.edu/)

ANSC 3511 - Junior Dairy Fellows (2 Credits)
Designed for undergraduates who have a sincere interest in dairy production management and the dairy industry. The objective of this course is to impart further understanding of the integration and application of dairy science to dairy production enterprises and related industries. The course emphasizes a wide range of dairy- and agriculture-related businesses and personnel that work with the dairy industry worldwide.
Prerequisites: ANSC 2500.
Enrollment Information: Enrollment limited to: juniors.
Exploratory Studies: (CU-CEL)

Last Four Terms Offered: Spring 2025, Spring 2024, Spring 2023, Spring 2022
Learning Outcomes:
- Enhance knowledge of dairy science, and gain critical thinking skills in applied dairy science.
- Develop ideas on current dairy production management topics and defend their positions through evidence-based approaches, communication and debate.
- Develop networking skills and participate in professional meetings and field experiences related to the dairy industry.

Schedule of Classes (https://classes.cornell.edu/)

ANSC 3540 - Dairy Cattle Herd Health (3 Credits)
This course will introduce students to dairy herd health concepts and strategies for achieving health, productivity, and profitability goals through management. Health and performance monitoring by the use of dairy records, disease prevention, and evidence-based approaches to management will be stressed. Students should expect to develop their knowledge of dairy cattle diseases and health, acquire skills for implementing dairy herd management programs, and strengthen their abilities to problem solve and communicate in group settings.
Prerequisites: ANSC 2500 or permission of instructor.
Exploratory Studies: (CU-SBY)

Last Four Terms Offered: Fall 2024, Fall 2023, Fall 2022, Fall 2021
Learning Outcomes:
- Demonstrate a basic understanding of health, disease, and performance in dairy cattle and replacements.
- Describe the most prevalent and highest impact health challenges in modern dairy production systems and understand management approaches for their prevention and control.
- Make economical, resourceful, and ethical decisions about health management in dairy herds.

Schedule of Classes (https://classes.cornell.edu/)

ANSC 3550 - Dairy Cattle Nutrition (3 Credits)
Provides a foundation in the principles of dairy cattle nutrition and dairy ration formulation with emphasis on application of feeding programs on dairy farms. Laboratory emphasizes hands-on evaluation of feeds, use of ration formulation software for ration evaluation and formulation, and case study analysis of dairy farms.
Prerequisites: ANSC 2500 or permission of instructor.
Last Four Terms Offered: Spring 2025, Spring 2024, Spring 2023, Spring 2022
Learning Outcomes:
- Apply critical thinking skills to dairy cattle nutrition and its application on dairy farm.
- Implement ration evaluation and apply to formulation software.
- Collaborate on farm analysis projects.
- Integrate dairy cattle nutrition programs into other aspects of dairy herd management.
- Articulate results of research investigations to an audience.

Schedule of Classes (https://classes.cornell.edu/)

ANSC 3560 - International Dairy Study Trip (0.5 Credits)
This first section of the course sequence is designed to prepare students for the intensive 8-10 day study trip (ANSC 3561) designed for exposure to a variety of dairy related agricultural production approaches in the country of interest. Topics will include dairy management, environmental regulations, profitability, related government support programs and the role of cultures impact on production.
Enrollment Information: Enrollment preference given to: juniors and seniors in Animal Science/Dairy Management.
Course Fee: Course Fee, $1780. Fee amount approximate, $1520.00 or $1,780.00, depending on meal costs.
Exploratory Studies: (CU-ITL)

Last Four Terms Offered: Fall 2024, Fall 2022, Fall 2019, Fall 2017
Learning Outcomes:
- Describe the economics and conditions surrounding milk production in the country of interest and compare to the USA.
- Describe the consumer expectations for dairy production and produces and compare this to the USA.
- Explain resource limitations for dairy production systems and provide context for that relative to future food production within the country.

Schedule of Classes (https://classes.cornell.edu/)

ANSC 3561 - International Dairy Study Trip II (0.5 Credits)
This portion of the course is an intensive 8-10 day study trip designed for exposure to a variety of dairy-related agricultural production approaches in the country of interest. Topics will include dairy management, environmental regulations, profitability, related government support programs and the role of cultures impact on production.
Prerequisites: ANSC 3560.
Course Fee: Course Fee, TBA. TBA.
Exploratory Studies: (CU-CEL, CU-ITL, CU-SBY)

Last Four Terms Offered: Winter 2025, Winter 2023, Winter 2020, Spring 2018
Learning Outcomes:

- Analyze dairy food production systems in the country of interest and compare with the system of dairy production in the U.S.
- Describe the impact of government support for agricultural development and compare that with the U.S. policy.
- Recognize the diversity of the dairy production system in the country of interest.
- Describe the impact of government support for agriculture development and compare that with current U.S. policy.
- Articulate and explain the views on the future of dairy production from the perspective of dairy producers in the country of interest and how that role intersects with environmental policy.

Schedule of Classes (https://classes.cornell.edu/)

ANSC 3562 - International Dairy Study Trip III (0.5 Credits)
This final course of the sequence is designed to reflect on the intensive 8-10 day study trip where students were exposed to a variety of dairy-related agricultural production approaches in the country of interest. Topics will include dairy management, environmental regulations, profitability, related government support programs and the role of cultures impact on production.
Prerequisites: ANSC 3560 and ANSC 3561.
Exploratory Studies: (CU-SBY)

Last Four Terms Offered: Spring 2025, Spring 2023, Spring 2020
Learning Outcomes:

- Evaluate the diversity of the dairy production systems and the role that agriculture plays in meeting the energy needs of the country of interest.
- Synthesize the role that environmental policy is playing in the perspective of dairy producers on the future of dairy production in their country.
- Explain resource limitations for the dairy production systems in the country of interest and provide context for their limitations relative to the future food production within the observed system.
- Explore the similarities and differences between dairy production observed in the country of interest and the U.S.

Schedule of Classes (https://classes.cornell.edu/)

ANSC 3600 - Beef Cattle (3 Credits)
Management of nutrition, selection, health, and reproduction of beef cattle. Lectures and laboratories give students practical knowledge of beef production and the scientific background for improving management practices. Students feed and care for feedlot calves several times throughout the semester.
Distribution Requirements: (AFS-AG)
Last Four Terms Offered: Spring 2024, Spring 2022, Spring 2020, Spring 2018
Learning Outcomes:

- Students will acquire knowledge of beef cattle production and management.
- Students will gain practical experience through practice and simulation of management activities.

Schedule of Classes (https://classes.cornell.edu/)

ANSC 3700 - Immunology in Animal Health and Disease (3 Credits)
This course offers a comprehensive overview of the immune system, from its fundamental components to its intricate responses to various threats. The curriculum begins with a foundation in the diverse mechanisms underlying both innate and adaptive immune responses. Students will then engage in case-based studies that integrate and advance both fundamental and applied aspects of immunology, tailored to the essentials of pre-veterinary and production agriculture students.
Prerequisites: BIOAP 1100 or BIOG 1440.
Distribution Requirements: (OPHLS-AG)
Last Four Terms Offered: Spring 2025, Spring 2024, Spring 2023, Spring 2022
Learning Outcomes:

- Explain the role of the immune system and identify the types of threats it defends against.
- Analyze the roles of different immune cells and their modalities in maintaining immunity.
- Correlate different mechanisms in an immune response to the various pathogen classes and other triggers.
- Discuss the mechanisms behind vaccines and immune-based treatments.
- Apply core immunological principles to understand veterinary cases of diseases/disorders.
- Cultivate informed perspectives regarding applied immunology in domestic animals.

Schedule of Classes (https://classes.cornell.edu/)

ANSC 3800 - Sheep (3 Credits)
Breeding, feeding, management, and selection of sheep. Lectures and laboratories are designed to give students practical knowledge of managing sheep for meat, milk, and wool production as well as the scientific background for improving management practices. Students spend several days during the semester feeding and caring for ewes and their newborn lambs and milking ewes in a dairy setting.
Last Four Terms Offered: Fall 2024, Spring 2021, Spring 2019, Spring 2017
Learning Outcomes:

- Students will acquire knowledge of sheep production and management.
- Students will gain experience through practice and simulation of management activities.

Schedule of Classes (https://classes.cornell.edu/)

ANSC 3900 - Animal Welfare Science Journal Club (1 Credit)
This course will provide students with an opportunity to select, critically evaluate, and discuss current scientific literature and to expand their understanding of the science of animal welfare. Students will meet once a week with the instructor for a journal club-style discussion. Papers will be selected by that week's student presenter (and approved by the instructor) from a provided list of current issues of several animal welfare journals. Group discussions will focus on the merits of the research presented, validity and relevance of the findings, and the significance of the work in the field. Two structured lectures will begin the course and will cover topics including: choosing a scientific article, evaluating study design, interpreting figures, basic statistics, and how to present in a journal club setting.
Prerequisites: ANSC 2300 or ANSC 3100.
Last Four Terms Offered: Spring 2024, Spring 2023, Spring 2022, Fall 2020
Learning Outcomes:

- Select scientific journal articles to further their understanding of a subject of interest.
- Critically evaluate scientific literature, including analysis of: literature reviews; study design; basic statistical analyses; whether conclusions are supported by sufficient evidence.
- Discuss current scientific literature in a thoughtful manner.
- Explain scientific findings to their peers.
- Describe recent advances in understanding in the field of animal welfare science.

Schedule of Classes (https://classes.cornell.edu/)

ANSC 3920 - Mechanisms of Animal Growth and Development (2 Credits)
A course on the basic biology of animal growth and development. The course relies on data obtained from a variety of species to describe whole animal growth patterns through life and the molecular and cellular mechanisms underpinning the formation of key tissues. Lecutres cover (1) patterns of whole-animal growth during fetal and postnatal life; (2) molecular and cellular basis of formation and development of skeletal muscle, adipose tissue, and bone; (3) regulation of growth and development by hormones and growth factors.
Prerequisites: BIOAP 1100 or equivalent introductory physiology courses.
Distribution Requirements: (OPHLS-AG)
Last Four Terms Offered: Spring 2025, Spring 2023, Spring 2021, Spring 2019
Learning Outcomes:

- Describe animal growth from embryonic life to maturity. Contrast the growth of individual tissues over time. Use this information to explain changes in body composition throughout life.
- Be familiar with the major developmental events leading to the formation of skeletal muscle and adipose tissue.
- Understand the role of major transcription factors in control of differentiation and growth of skeletal muscle and adipose tissue.
- Name the major components of the growth hormone (GH) -insulin-like growth factor-I (IGF-I) and leptin systems. Understand the role of each system in coordinating specific aspects of growth (e.g., linear growth for the GH-IGF system; energy partition and lipid deposition for the leptin system).
- Explain how events occurring during fetal life can exert long lasting effects after birth. Trace these long-lasting effects to specific mechanisms taking place during fetal or early postnatal life.
- Evaluate the scientific literature in one area of high interest to biology of growth and articulate deeper knowledge in this area through a poster presentation.

Schedule of Classes (https://classes.cornell.edu/)

ANSC 4020 - Seminar in Animal Sciences (1 Credit)
Reports of undergraduate honors research projects. Students present oral reports of their work for class discussion in addition to written reports.
Enrollment Information: Enrollment limited to: students engaged in undergraduate honors research projects.
Exploratory Studies: (CU-UG)

Last Four Terms Offered: Spring 2025, Spring 2024, Spring 2023, Spring 2022
Schedule of Classes (https://classes.cornell.edu/)

ANSC 4040 - Data Science Applications in Agriculture (4 Credits)
This course provides an experience in challenge-based learning, focusing on data-driven problems in the agricultural sector. Students work in collaborative teams, engaging with farmers and industry stakeholders to understand real-world challenges and develop innovative solutions. Students will use various digital tools essential for modern data science. Key topics include data governance, privacy, collection methods, storage solutions, processing techniques, and advanced visualization. Students will also learn data modeling and effective data presentation. Project management is a core component, teaching students to manage projects, meet deadlines, and deliver timely results. The course emphasizes teamwork, communication, and collaboration, preparing students for diverse and dynamic environments. This course is ideal for those interested in applying data science to real-world problems and making a tangible impact in agriculture.
Prerequisites: A statistical course such one of the following: STSCI 2150: Introductory Statistics for Biology, BTRY3010: Biological Statistics I, ILRST 2100: Introductory Statistics.
Distribution Requirements: (DLG-AG)
Learning Outcomes:

- Explain the fundamentals of data science and digital agriculture including their interdisciplinary challenges.
- Implement the various data science technologies, precision farming techniques and digital tools used in modern agriculture.
- Conduct data collection, visualization, analysis, and interpretation within the context of digital agriculture.
- Acquire practical skills through hands-on programming activities.
- Explore the applications of machine learning and artificial intelligence in agriculture.
- Recognize the significance of, and apply, data privacy and security techniques in digital agriculture.

Schedule of Classes (https://classes.cornell.edu/)

ANSC 4110 - Integrated Cattle Nutrition (4 Credits)
Integrates concepts of cattle nutrition and farm nutritional management to help students understand and appreciate factors influencing the performance of cattle under diverse conditions. Topics include the effect of environment on maintenance costs; the nutrient requirements for various stages of growth, lactation, and pregnancy; rumen function; feed composition and chemistry; nutrient partitioning; and the environmental impacts of cattle and how to minimize them. Computer models (Cornell Net Carbohydrate and Protein System) are used in the laboratory to actualize the information presented in lectures. Herd case studies are used in lab and there are field trips to farms to evaluate the nutritional management.
Prerequisites: BIOAP 1100 and ANSC 2120, or equivalent.
Enrollment Information: Enrollment limited to: juniors and seniors.
Distribution Requirements: (DLG-AG)
Exploratory Studies: (CU-SBY)

Last Four Terms Offered: Fall 2024, Fall 2023, Fall 2022, Fall 2021
Learning Outcomes:

- Cultivate skills for cattle diet construction and evaluation using software that allows for the determination of first limiting nutrients.
- Articulate how nutrient metabolism can affect health and productivity of cattle.
- Apply concepts of feed chemistry, microbial growth and rumen function to reduce the environmental impact of milk and meat production while optimizing economic productivity.
- Explain the metabolic regulation and change in nutrient requirements when animals move from one physiological state to another.
- Integrate quantitative thinking to nutritional problem solving and gain an appreciation for modeling approaches to solving problems in animal agriculture.

Schedule of Classes (https://classes.cornell.edu/)

ANSC 4120 - Whole-Farm Nutrient Management (4 Credits)
Provides students with an understanding of the concepts and practices underlying whole-farm nutrient management planning of livestock and dairy farms. Improving profitability and efficiency are key factors considered while improving air and water quality associated with dairy production. Students learn about nutrient management on (Concentrated) Animal Feeding Operations ((C)AFO's) and conduct a whole farm nutrient balance for a farm of choice. This course integrates crop and manure management with nutrition and herd management to provide a broad but focused and action-oriented approach. The course utilizes three software programs for nutrient management planning and herd nutritional management: Cropware, the Cornell Net Carbohydrate and Protein System (CNCPS), and the Whole Farm Nutrient Mass Balance program. Current topics are also discussed, such as greenhouse gas emissions and impacts of dairy and livestock production and local versus global food production and environmental impacts.
Enrollment Information: Enrollment limited to: juniors and seniors.
Distribution Requirements: (AFS-AG, SCH-AG)
Exploratory Studies: (CU-SBY)

Last Four Terms Offered: Spring 2025, Spring 2024, Spring 2023, Spring 2022
Learning Outcomes:
- Describe the current environmental policies for agriculture and environmental management nationwide and in New York and explain the reasons the having such policies in place Discuss and debate the importance of and benefits of nutrient management and whole farm planning for the agricultural industry.
- Explain the components of a certified nutrient management plan and demonstrate understanding of nutrient management planning in conversations with planning and plan evaluation professional in the industry.
- Evaluate and compare the whole farm planning and management system of a farm from soil to crops to cows and back, and recommend changes for improvements in agriculture and environmental management in future years.
- Identify the importance of agricultural industry involvement in addressing production and environmental challenges and setting policy and constructively communicate with and debate with policy makers.
- Describe the role dairy cattle play in utilizing byproducts of the human food chain that contribute to reducing the environmental impact of all human food production.

Schedule of Classes (https://classes.cornell.edu/)

ANSC 4140 - Ethics and Animal Science (3 Credits)
This course explores the origins of ethics and morality, the place of humans in the biological world, and the concept of speciesism. The course centers around the ethical considerations for the humane use of animals for research and agricultural purposes, companion animals, work animals, animals used for human entertainment, and transgenic animals.
Enrollment Information: Enrollment limited to: juniors or seniors.
Distribution Requirements: (ETH-AG, KCM-AG)
Last Four Terms Offered: Spring 2024, Spring 2023, Spring 2022, Spring 2021
Learning Outcomes:
- Describe the main philosophical frameworks used in animal ethics and compare and contrast the many factors that influence decisions about the use of animals for agriculture, research, etc.
- Reflect on their own ethical judgements.
- Distinguish what makes an ethical issue, as opposed to opinion, fact, emotion, etc.
- Argue and defend a stance on ethical issues related to the use of animals.
- Demonstrate effective written and oral communication skills and the ability to work effectively as part of a team.

Schedule of Classes (https://classes.cornell.edu/)

ANSC 4200 - Nutrition of Cats and Dogs (3 Credits)
The purpose of this course is to provide students with a solid foundation of knowledge on cat and dog nutrition to prepare them for careers in animal nutrition research, veterinary medicine, and the pet food industry. The course is divided into 5 modules. The first part of the course discusses ingredient and nutrient requirements of felids and canids by teaching students to integrate knowledge of evolutionary feeding habits, gastrointestinal anatomy, digestive processes, and nutrient metabolism. The second part covers practical feedings through the teaching of feed ingredient sourcing and processing, and the pet food manufacturing regulations. The third focusses on metabolic disorders of nutrient metabolism. Learning activities consist of daily student reflections, designing hypothesis-driven questions, discussing peer-reviewed articles, and presenting a final project.
Prerequisites: ANSC 2120.
Last Four Terms Offered: Fall 2024, Fall 2023, Fall 2022, Fall 2021
Learning Outcomes:
- Evaluate ingredient and nutrient adequacy of commercial foods for domestic felids and canids.
- Evaluate best feeding practices for a domestic felid and canid with a given common underlying metabolic disorder.
- Design a complete feed for a domestic felid and canid.

Schedule of Classes (https://classes.cornell.edu/)

ANSC 4270 - Fundamentals of Endocrinology (3 Credits)
Crosslisted with BIOAP 4270
Physiology and regulation of endocrine secretions. Emphasizes neuroendocrine, reproductive, growth, and metabolic aspects of endocrinology. Examples are selected from many animals, including humans.
Prerequisites: BIOAP 1100 or BIOG 1440, or permission of instructor.
Distribution Requirements: (BIO-AS), (OPHLS-AG)
Last Four Terms Offered: Fall 2024, Fall 2023, Fall 2022, Fall 2021
Learning Outcomes:

- Define the organization of the endocrine system with a focus on mammals.
- Explain the physiological function of major hormones and interactions among components of the endocrine system to control homeostasis.
- Describe the cellular source, biosynthesis, chemical nature, storage, factors controlling its secretion, cellular mechanisms of action on target cells, and physiological functions for each major hormone.
- Predict the consequences of disturbances in components of the endocrine system.
- Illustrate how basic scientific research as well as clinical studies of endocrine disorders contribute to the advancement of basic knowledge and development of therapeutic strategies for endocrine disorders.
- Appraise how the acquisition of knowledge about the endocrine system is ongoing and how key advances in technology from multiple fields (physiology, cell biology, biochemistry, and genetics) have promoted advancements in knowledge of the endocrine system.

Schedule of Classes (https://classes.cornell.edu/)

ANSC 4280 - Comparative Nutrition of the Horse and Pig (3-4 Credits)
Throughout their evolution, members of the Suidae family have adopted omnivorous feeding strategies of great elasticity. They share similar gastrointestinal physiological traits with the Equidae family members, which have remained strict obligate herbivores. Learning nutrition of the domestic horse and pig under the same umbrella offers a way to exploit their differences and similarities and understand the underlying factors that dictate their nutrient and feed requirements. The course covers the following topics using a comparative approach between the two species: gastrointestinal anatomy and digestive processes, feed ingredients and composition, feeding behavior and management, and diet-induced metabolic disorders. Learning activities include discussions, weekly journaling, monthly short research papers, gastrointestinal tract dissections, diet evaluation and formulation, field trips, and hands-on feeding trial(s).
Prerequisites: BIOAP 1100, ANSC 2120, and ANSC 2650.
Last Four Terms Offered: Spring 2025, Spring 2024, Spring 2023, Spring 2022
Learning Outcomes:

- Recommend best feeding practices to maintain health and wellbeing of horses and pigs.
- Formulate a simple diet for a pig at a given stage of life cycle.
- Formulate a simple diet for a horse at a given stage of life cycle.
- Evaluate the nutritional adequacy of a given equine and swine diet.

Schedule of Classes (https://classes.cornell.edu/)

ANSC 4290 - Management of Nutrient Disorders in Cats and Dogs (1 Credit)
While many subjects are covered in ANSC 4200, offered in the fall, there is limited time to address all of the current topics in cat and dog nutrition. This course provides a unique opportunity for students to explore disorders of nutrient metabolism in greater depth, either associated with specific breeds or resulting from mismanaged nutrition. Each week, a different disorder will be studied, covering a total of 13 disorders. These include but are not limited to: copper storage diseases, vitamin B12 malabsorption, obesity and type 2 diabetes, hyperlipidemia, lipoprotein lipase deficiency in cats, feline hepatic lipidosis, calcium and phosphorus imbalances, and urolithiasis.
Enrollment Information: Enrollment limited to: juniors and seniors.
Last Four Terms Offered: Spring 2025, Spring 2024, Spring 2022
Learning Outcomes:

- Explain the most common disorders associated with nutrient metabolism in cats and dogs.
- Describe nutritional management strategies to mitigate the health impacts of these disorders.
- Evaluate commercial therapeutic diets with health claims.

Schedule of Classes (https://classes.cornell.edu/)

ANSC 4310 - Animal Genomics and Epigenomics (3 Credits)
Animal Genomics and Epigenomics provides a foundation in functional genomics, epigenomics, and basic bioinformatics. It is designed to facilitate mastery of advanced techniques in genomics and their applications to animal biology, health, and production. The course consists of weekly lectures covering basic concepts and weekly workshops (computer labs or journal discussion). Workshops consist of exercises and discussions to provide students with hands-on experience performing basic genomic analyses. Students will become familiar with the UCSC genome browser, databases, and basic bioinformatic tools. Students will work in groups on a final project and develop research goals to study function(s) of a specific gene of interest.
Prerequisites: ANSC 2210 or equivalent genetics class.
Last Four Terms Offered: Fall 2024, Fall 2023, Fall 2022
Learning Outcomes:

- Define basic animal genomic and epigenomic concepts.
- Explain the epigenetic reprogramming and regulation of gene expression.
- Recognize genome browsers, databases, and basic bioinformatics tools.
- Describe functional genomic and next-generation sequencing (NGS) methods, and their applications.
- Design a search for the gene of their interests and data from online databases.
- Appraise interesting questions in the field of animal genomic and discuss original research papers in animal genomics and epigenetics.
- Work within a group to propose interesting research ideas.
- Graduate students will be able to compose a written report with literature review and elements of experimental design on topics within the field.

Schedule of Classes (https://classes.cornell.edu/)

ANSC 4410 - Metabolic Physiology (3 Credits)
The course will integrate animal nutrition, biochemistry, and physiology. The overall goal is to enhance understanding of intermediary metabolism and metabolic adaptations that develop to support different physiological states. The comparative study of biochemistry across mammalian species will be emphasized. The structural and functional roles of biochemicals and the ability of hormones to influence their metabolic fate will be highlighted.
Prerequisites: BIOAP 1100, ANSC 2120 or equivalents.
Enrollment Information: Enrollment limited to: juniors and seniors.
Last Four Terms Offered: Spring 2025, Spring 2024, Spring 2023, Spring 2022
Learning Outcomes:

- Integrate basic and complex metabolic pathways that converge to maintain energy homeostasis and life in mammals.
- Identify shifts in metabolism that develop to support changes in physiological states such as starvation, growth, pregnancy, and lactation.
- Define the relationship between nutrition and metabolism with an emphasis on anabolic and catabolic reactions that are specific for unique tissues.
- Compare and contrast nutritional physiology and biochemistry in various mammalian species with conserved metabolic adaptations to support their survival in unique environments.
- Recognize the critical role of endocrine hormones on energy metabolism.
- Define key intracellular signaling pathways that fundamentally link endocrine hormones with their metabolic action.
- Apply concepts and processes of nutritional physiology and biochemistry within the context of contemporary animal production challenges that influence health and performance.

Schedule of Classes (https://classes.cornell.edu/)

ANSC 4500 - Model Organisms in Reproductive Sciences (2 Credits)
This course provides an in-depth study of the reproductive physiology, endocrinology, as well as molecular, cellular and genetic regulation of reproduction in companion animals and model organisms advantageous for investigating specific questions in reproductive sciences. Comparisons will be made among species to highlight the unique biology and application of each species as a tool for experimentation. The impact of environment and adaptation in the context of reproductive success and evolution will also be discussed. Classic and state-of-the-art biotechnology and experimental approaches will be delineated. Close readings of scientific papers will be emphasized. This course promote an interactive and inclusive learning environment for critical thinking and creative problem solving. In addition, students will be exposed to current research performed by CU faculty in reproductive sciences.
Prerequisites: ANSC 2400 or equivalent, or permission of instructor.
Last Four Terms Offered: Fall 2023, Fall 2021, Fall 2020, Fall 2019
Learning Outcomes:

- Describe the reproductive anatomy, physiology, and endocrinology in multiple species of interest and significance to reproductive sciences.
- Compare and contrast unique and general reproductive functions of model organisms and their advantages for investigating lines of questions in reproductive biology.
- Critically evaluate contemporary scientific literature in reproductive biology to identify conceptual and technical knowledge gaps in reproductive biology.
- Exercise data-driven reasoning, decision-making, and problem-solving processes.
- Design experiments to answer current questions and test novel hypotheses in reproductive biology.
- Formulate and refine research questions and hypotheses that expand understanding of reproductive biology and technology.
- Collaborate and lead group discussions on current research in reproductive biology.
- Appreciate the fascinating evolution, depth and breadth of reproductive sciences as a frontier of biological research, and the many open questions to be researched.

Schedule of Classes (https://classes.cornell.edu/)

ANSC 4510 - Dairy Herd Business Management (4 Credits)
Emphasizes dairy herd business management with application to herd management analysis. Laboratory includes farm tours and analysis.
Prerequisites: ANSC 2500 or equivalent, ANSC 3510, ANSC 3511, and AEM 3020, or permission of instructor.
Distribution Requirements: (DLG-AG)
Exploratory Studies: (CU-CEL)

Last Four Terms Offered: Fall 2024, Fall 2023, Fall 2022, Fall 2021
Learning Outcomes:

- Develop critical thinking and verbal communication skills in business and financial decision making.
- Develop group-based business outcomes through classroom discussion and interaction in support of their decision-making process.
- Interact with dairy farm families and employees and analyze financial data to identify and solve real-life problems.

Schedule of Classes (https://classes.cornell.edu/)

ANSC 4560 - Dairy Management Fellowship (2 Credits)
Designed for undergraduates who have a sincere interest in dairy farm management. The course objective is to gain further understanding of the integration and application of dairy farm management principles and programs with respect to progressive dairying and related industries. There are field trips focusing on dairy farm business analyses and feedback, along with other experiential learning activities and professional development and networking opportunities. Field trips will be held on announced Saturdays throughout the course of the semester.
Prerequisites: ANSC 2500, ANSC 3510, AEM 3020, ANSC 3511 and ANSC 4510.
Enrollment Information: Enrollment limited to: seniors.
Exploratory Studies: (CU-CEL)

Last Four Terms Offered: Spring 2025, Spring 2024, Spring 2023, Spring 2022
Learning Outcomes:

- Conduct comprehensive dairy farm business evaluations that includes financial, human resource, herd level and CAFO level decision making and provide real-time feedback to the owner and manager and integrate sustainability and generational transfer as components of the process.
- Recognize how and develop the skill to transfer business equity among generations and how to do the same thing with non-family partners while maintaining the viability of the business. This includes the use of insurance and other risk management tools available.
- Recognize potential risks to the business (financial, environmental, market, human and animal welfare) how to use current tools to mitigate or minimize risk and develop the appropriate approach to ensure profitability and sustainability of the business.
- Properly identify actual and perceived risks by consumers and non-producers and further to effectively communicate a response to such inquiries and to take appropriate action when needed.
- Identify how and why conflict arises in family business and develop appropriate strategies for overcoming the conflict to minimize the effect of conflict on family and business function and dynamics.

Schedule of Classes (https://classes.cornell.edu/)

ANSC 4880 - Global Food, Energy, and Water Nexus – Engage the US, China, and India for Sustainable Future (3-4 Credits)
Crosslisted with FDSC 4880, AEM 4880, CHEME 4880, GDEV 4880
This course is offered by six Departments at Cornell, in collaboration with five Universities in China and India. Video conferencing will be used to connect classrooms in the three countries in real time. Important issues related to the food, energy, and water nexus and its implications for nutrition security, one health, environmental sustainability,climate change, and economic development in the US, China, India, and other countries will be described. Challenges associated with these issues will be evaluated and strategies to address them will be proposed. Engagement of these countries with each other and the rest of the world will be explored. The course serves as a platform for students from Cornell, China, and India to learn from and interact with each other in the same class, and to share their thinking, creativity, and perspectives on these issues.
Enrollment Information: Enrollment limited to: juniors or seniors only.
Distribution Requirements: (AFS-AG, D-AG, SCH-AG)
Exploratory Studies: (CU-ITL, CU-SBY); (SAAREA)

Last Four Terms Offered: Fall 2024, Fall 2023, Fall 2022, Fall 2021
Learning Outcomes:

- Identify and compare the major food, nutrition and health, energy, water, and economic challenges facing the US, China, and India.
- Describe barriers to food and nutrition security for all people in each of the three countries and globally and propose solutions for overcoming these barriers.
- Identify and quantify the requirements of energy and water for producing, processing, transporting, and/or preparing food.
- Evaluate various predictions of regional and global impacts of climate change on agricultural production and human health in the 21st century.
- Collaborate as members of interdisciplinary teams composed of students from the US, China, and India to analyze and solve problems that affect food, water, and energy security.
- Effectively and respectfully debate, with people of opposing views, issues related to food, water, and energy nexus.
- Prepare and deliver focused, clear, impactful, and culturally sensitive presentations to an international audience of peers .

Schedule of Classes (https://classes.cornell.edu/)

ANSC 4940 - Special Topics in Animal Science (1-4 Credits)
The department teaches trial courses under this number. Offerings vary by semester and are advertised by the department before the semester begins. Courses offered under the number will be approved by the department curriculum committee, and the same course is not offered more than twice under this number.
Enrollment Information: Enrollment limited to: undergraduates.
Last Four Terms Offered: Spring 2025, Spring 2024, Spring 2023, Fall 2022
Schedule of Classes (https://classes.cornell.edu/)

ANSC 4960 - Internship in Animal Science (1-3 Credits)
Structured, on-the-job learning experience under supervision of qualified professionals in a cooperating organization (e.g., farm, agribusiness, pharmaceutical company, zoo, educational institution). Internships are arranged by the student and must be approved in advance by the student's academic advisor. The internship should provide a professionally supervised experience with at least 60 hours on the job per credit required. All ANSC 4960 internship courses must adhere to the CALS guidelines at cals.cornell.edu/academics/student-research/internship.
Last Four Terms Offered: Spring 2025, Fall 2024, Spring 2024, Fall 2023
Schedule of Classes (https://classes.cornell.edu/)

ANSC 4970 - Individual Study in Animal Science (1-3 Credits)
May include individual tutorial study or a lecture topic selected by a professor. Because topics may change, the course may be repeated for credit.
Enrollment Information: Enrollment limited to: students in Animal Science.
Last Four Terms Offered: Spring 2025, Fall 2024, Spring 2024, Fall 2023
Schedule of Classes (https://classes.cornell.edu/)

ANSC 4980 - Undergraduate Teaching in Animal Science (1-4 Credits)
Designed to consolidate the student's knowledge. A participating student assists in teaching a course allied with his or her education and experience. The student is expected to meet regularly with a discussion or laboratory section, to gain teaching experience, and regularly to discuss teaching objectives, techniques, and subject matter with the professor in charge.
Prerequisites: GPA of at least 2.7.
Last Four Terms Offered: Spring 2025, Fall 2024, Spring 2024, Fall 2023
Schedule of Classes (https://classes.cornell.edu/)

ANSC 4990 - Undergraduate Research in Animal Science (1-6 Credits)
Affords opportunities for students to carry out independent research under appropriate supervision. Each student is expected to review pertinent literature, prepare a project outline, conduct the research, and prepare a report.
Prerequisites: GPA of at least 2.7.
Exploratory Studies: (CU-UG)

Last Four Terms Offered: Spring 2025, Fall 2024, Spring 2024, Fall 2023
Schedule of Classes (https://classes.cornell.edu/)

ANSC 5100 - Animal Welfare (3 Credits)
This course will cover the basic principles, history, and application of animal welfare science for multiple species. Students will learn to assess the welfare of animals in a variety of settings using science-based methods and reasoning. The objective of this course is to provide students with a background in and ability to apply principles of animal welfare science, which will facilitate their ability to successfully engage in welfare deliberations.
Prerequisites: one semester of college level Biology (BIOAP 1100 or equivalent), animal management (ANSC 2100 or equivalent) or animal behaviors/ethics.
Last Four Terms Offered: Spring 2025, Fall 2023, Fall 2022, Fall 2021
Learning Outcomes:

- Explain and apply common definitions and applications of animal welfare.
- Assess animal welfare using animal behavior, physiology, and other evidence-based measures.
- Assess legislation, public policy, and assurance programs related to animal welfare.
- Obtain, critically evaluate, summarize, and synthesize scientific literature related to animal welfare science.
- Identify and describe interacting factors that can support or constrain sustainability as it relates to animal welfare.

Schedule of Classes (https://classes.cornell.edu/)

ANSC 5140 - Ethics and Animal Science (3 Credits)
This course explores the origins of ethics and morality, the place of humans in the biological world, and the concept of speciesism. The course centers around the ethical considerations for the humane use of animals for research and agricultural purposes, companion animals, work animals, animals used for human entertainment, and transgenic animals.
Enrollment Information: Enrollment limited to: graduate students.
Distribution Requirements: (ETH-AG, KCM-AG)
Last Four Terms Offered: Spring 2024, Spring 2023, Spring 2022
Learning Outcomes:

- Describe the main philosophical frameworks used in animal ethics and compare and contrast the many factors that influence decisions about the use of animals for agriculture, research, etc.
- Reflect on their own ethical judgements.
- Distinguish what makes an ethical issue, as opposed to opinion, fact, emotion, etc.
- Argue and defend a stance on ethical issues related to the use of animals.
- Demonstrate effective written and oral communication skills and the ability to work effectively as part of a team.

Schedule of Classes (https://classes.cornell.edu/)

ANSC 5210 - Principles of Animal Genetics (4 Credits)
This course focuses on the genetic foundation and improvement of domestic species. Basic cellular biology and DNA replication will lay the groundwork for understanding the genetic mechanisms underlying traits, modern genomic tool development, and analysis methods. Critical thinking towards animal breeding and management will require an understanding of heritability, population dynamics, rate of selection, and genetic and economic gain. Software and reference programs will be used to investigate animal genes and genomes, individual genotypes through DNA sequence or whole-genome marker panels, and statistical associations between traits and genetic markers. Modern examples, practical applications, and hands-on tools will be key components of this class in order to appreciate the intricacies of genetics and the future of genomic research for the improvement and management of animals.
Prerequisites: two semesters of college-level biology.
Enrollment Information: Enrollment limited to: graduate students.
Last Four Terms Offered: Spring 2025, Spring 2024, Spring 2023, Spring 2022
Learning Outcomes:

- Explain basic genetic principles including DNA replication and mutations, Mendelian inheritance, codominance, epistatis, and complex traits and how these factors effect phenotypic traits.
- Interpret modern genotyping techniques, data generated, and analytical methods to critically evaluate research and identify significant details, research integrity, and outcomes.
- Critically evaluate a population for decision making by calculating genotype and allele frequencies and using factors such as inbreeding, hybrid vigor, effective population size, and genetic drift as guidance.
- Evaluate the pros and cons of selection schemes for implementing genetic improvement in livestock and domestic animals.
- Apply genetic principles towards the improvement of the health and production of livestock and domestic animals.

Schedule of Classes (https://classes.cornell.edu/)

ANSC 5220 - Professional Development Seminar (1 Credit)
This course is designed to train students in the Master of Professional Studies program in communication and presentation skills needed for future careers. Each student will present several times on their capstone project. Advice, feedback, and peer-evaluation will be provided to each presenter. This course also aims to foster collegiality, expand knowledge, and promote professional development among graduate students in a broad context within this diverse field.
Last Four Terms Offered: Spring 2025, Fall 2024, Spring 2024, Fall 2023
Learning Outcomes:

- Create clear and organized presentations tailored to an audience.
- Communicate information clearly and effectively to an audience.

Schedule of Classes (https://classes.cornell.edu/)

ANSC 5300 - Fish Physiology (3 Credits)
Crosslisted with BIOAP 5300
Fish Physiology is an introduction to the functional biology of fish. Lecture topics will cover cellular and tissue function within key physiological systems that help fish thrive in a wide range of aquatic habitats, from mountain streams to deep-sea vents. These systems will be illustrated using a diverse variety of fish, while broader comparisons between fish and higher vertebrates will also be drawn. Discussion will integrate aquaculture, fisheries, and environmental contexts, including some of the anthropogenic challenges that fish face today and what can be done to mitigate them. Students will perform a gross dissection to identify anatomy in situ and visit an aquaculture facility (there is no separate lab section).
Prerequisites: one semester of introductory animal physiology (BIOAP 1100, BIOG 1440, BIOG 1445 or equivalent), or permission of instructor.
Exploratory Studies: (CU-SBY)

Last Four Terms Offered: Spring 2025, Spring 2024, Spring 2023, Spring 2022
Learning Outcomes:

- Characterize various physiological systems that fish use to live in an aquatic environment.
- Describe how these systems adjust to environmental changes in the short and long term.
- Explain physiological differences between groups of fishes.
- Explain how physiological systems in fish may be similar to, differ from, or have evolved into those in terrestrial vertebrates.
- Discuss how unsustainable resource management and human perturbations in the environment affect fish at the physiological level.

Schedule of Classes (https://classes.cornell.edu/)

ANSC 5310 - Animal Genomics and Epigenomics (3 Credits)
Animal Genomics and Epigenomics provides a foundation in functional genomics, epigenomics, and basic bioinformatics. It is designed to facilitate mastery of advanced techniques in genomics and their applications to animal biology, health, and production. The course consists of weekly lectures covering basic concepts and weekly workshops (computer labs or journal discussion). Workshops consist of exercises and discussions to provide students with hands-on experience performing basic genomic analyses. Students will become familiar with the UCSC genome browser, databases, and basic bioinformatic tools. Students will work in groups on a final project and develop research goals to study function(s) of a specific gene of interest.
Prerequisites: ANSC 2210 or equivalent genetics class.
Last Four Terms Offered: Fall 2024, Fall 2023, Fall 2022
Learning Outcomes:

- Define basic animal genomic and epigenomic concepts.
- Explain the epigenetic reprogramming and regulation of gene expression.
- Recognize genome browsers, databases, and basic bioinformatics tools.
- Describe functional genomic and next-generation sequencing (NGS) methods, and their applications.
- Design a search for the gene of their interests and data from online databases.
- Appraise interesting questions in the field of animal genomic and discuss original research papers in animal genomics and epigenetics.
- Work within a group to propose interesting research ideas.
- Graduate students will be able to compose a written report with literature review and elements of experimental design on topics within the field.

Schedule of Classes (https://classes.cornell.edu/)

ANSC 5410 - Biology of the Mammary Gland in Health and Disease (2 Credits)
Crosslisted with BIOAP 5410
The course uses the mammary gland as the platform to illustrate the integration of physiological systems in the whole animal. Lectures cover the anatomy, development and endocrinology of the gland, composition and biosynthesis of milk and diseases related to mammary gland development and function. The information comes from a variety of mammals including the mouse for development, the dairy cow for production aspects and the human for diseases.
Prerequisites: BIOAP 1100 or introductory course in human or animal physiology.
Last Four Terms Offered: Spring 2024, Spring 2022
Learning Outcomes:

- List the major anatomical and physiological systems of the mammary gland and articulate how they support the fully functional gland.
- Describe the developmental and regulatory events leading to the formation of a fully functional mammary gland.
- Name the major components of milk and trace their synthesis to specific precursors and biochemical pathways.
- Explain the events leading to diseases associated with mammary development and lactation.
- Evaluate the scientific literature in one area of high interest to mammary gland biology and articulate deeper knowledge of this area through a poster presentation.

Schedule of Classes (https://classes.cornell.edu/)

ANSC 5450 - Reproductive Physiology and Management of Dairy Cattle (3 Credits)
This course integrates concepts of reproductive physiology, management, and economics of dairy cattle. Special emphasis is given to practices and technologies currently used in modern dairy operations. Laboratory sessions include hands-on learning of reproductive techniques and dairy herd management software. Concepts discussed in lecture and their respective application include: artificial insemination, rectal palpation and transrectal ultrasonography of the reproductive tract and ovaries, synchronization of estrus and ovulation, blood testing for pregnancy diagnosis, superovulation and embryo transfer, in-vitro fertilization and embryo production.
Prerequisites: ANSC 2400.
Exploratory Studies: (CU-SBY)

Last Four Terms Offered: Spring 2025, Spring 2024, Spring 2023, Spring 2022
Learning Outcomes:

- Integrate basic and complex aspects of reproductive physiology of dairy cattle.
- Illustrate the implications of physiological processes on reproductive management programs and herd performance.
- Design and implement reproductive management strategies to fulfill the specific needs of dairy herds.
- Analyze the reproductive performance of dairy herds using the latest software technologies and provide recommendations to optimize reproductive performance and farm profitability.
- Employ current reproductive technologies used in the dairy industry to maximize herd performance and propagation of cattle of superior genetic value.
- Recognize the value of reproductive biology, management programs, and herd performance on the overall profitability and sustainability of the dairy operation.

Schedule of Classes (https://classes.cornell.edu/)

ANSC 5500 - Model Organisms in Reproductive Sciences (2 Credits)
This course provides an in-depth study of the reproductive physiology, endocrinology, as well as molecular, cellular and genetic regulation of reproduction in companion animals and model organisms advantageous for investigating specific questions in reproductive sciences. Comparisons will be made among species to highlight the unique biology and application of each species as a tool for experimentation. The impact of environment and adaptation in the context of reproductive success and evolution will also be discussed. Classic and state-of-the-art biotechnology and experimental approaches will be delineated. Close readings of scientific papers will be emphasized. This course promote an interactive and inclusive learning environment for critical thinking and creative problem solving. In addition, students will be exposed to current research performed by CU faculty in reproductive sciences.
Prerequisites: ANSC 2400 or equivalent, or permission of instructor.
Last Four Terms Offered: Fall 2023, Fall 2021
Learning Outcomes:

- Describe the reproductive anatomy, physiology, and endocrinology in multiple species of interest and significance to reproductive sciences.
- Compare and contrast unique and general reproductive functions of model organisms and their advantages for investigating lines of questions in reproductive biology.
- Critically evaluate contemporary scientific literature in reproductive biology to identify conceptual and technical knowledge gaps in reproductive biology.
- Exercise data-driven reasoning, decision-making, and problem-solving processes.
- Design experiments to answer current questions and test novel hypotheses in reproductive biology.
- Formulate and refine research questions and hypotheses that expand understanding of reproductive biology and technology.
- Collaborate and lead group discussions on current research in reproductive biology.
- Appreciate the fascinating evolution, depth and breadth of reproductive sciences as a frontier of biological research, and the many open questions to be researched.

Schedule of Classes (https://classes.cornell.edu/)

ANSC 5510 - Dairy Herd Management (4 Credits)
Course integrates concepts of cow biology, management, economics, and sustainability of dairy operations. Special emphasis is given to management practices and technologies that affect cattle health and well-being, milk production and quality, reproduction, herd growth, milking, and environmental impact of dairy production. Basic concepts of dairy foods processing and the importance of milk quality for dairy products are covered. Laboratory sessions include hands-on learning of dairy software, analysis of alternative strategies, and decision-making. Commercial farm case studies are used to integrate concepts of biology and management learned in the course.
Prerequisites: ANSC 2500 or permission of instructor.
Exploratory Studies: (CU-CEL, CU-SBY)

Last Four Terms Offered: Spring 2025, Spring 2024, Spring 2023, Spring 2022
Learning Outcomes:
- Describe general features and recognize the challenges and opportunities of the global and national dairy industry.
- Understand the breadth and complexity of the biological mechanisms underpinning dairy cattle milk production, health, and reproduction and their implications on herd performance.
- Evaluate the past and present performance of a dairy herd using computer software.
- Recognize the implications of herd management programs and the use of technology on the profitability and sustainability of dairy farms.
- Describe the methods used for milk processing and the manufacture of dairy products and recognize the implications of herd management strategies on the quality and safety of dairy products.

Schedule of Classes (https://classes.cornell.edu/)

ANSC 5540 - Dairy Cattle Herd Health (3 Credits)
This course will introduce students to dairy herd health concepts and strategies for achieving health, productivity, and profitability goals through management. Health and performance monitoring by the use of dairy records, disease prevention, and evidence-based approaches to management will be stressed. Students should expect to develop their knowledge of dairy cattle diseases and health, acquire skills for implementing dairy herd management programs, and strengthen their abilities to problem solve and communicate in group settings.
Enrollment Information: Enrollment limited to: graduate students.
Exploratory Studies: (CU-SBY)

Last Four Terms Offered: Fall 2024, Fall 2023, Fall 2022, Fall 2021
Learning Outcomes:
- Demonstrate a basic understanding of health, disease, and performance in dairy cattle and replacements.
- Describe the most prevalent and highest impact health challenges in modern dairy production systems and understand management approaches for their prevention and control.
- Make economical, resourceful, and ethical decisions about health management in dairy herds.

Schedule of Classes (https://classes.cornell.edu/)

ANSC 5550 - Dairy Cattle Nutrition (3 Credits)
Provides a foundation in the principles of dairy cattle nutrition and dairy ration formulation with emphasis on application of feeding programs on dairy farms. Laboratory emphasizes hands-on evaluation of feeds, use of ration formulation software for ration evaluation and formulation, and case study analysis of dairy farms.
Prerequisites: ANSC 2500 or permission of instructor.
Last Four Terms Offered: Spring 2025, Spring 2024, Spring 2023, Spring 2022
Learning Outcomes:
- Apply critical thinking skills to dairy cattle nutrition and its application on dairy farm.
- Implement ration evaluation and apply to formulation software.
- Collaborate on farm analysis projects.
- Integrate dairy cattle nutrition programs into other aspects of dairy herd management.
- Articulate results of research investigations to an audience.

Schedule of Classes (https://classes.cornell.edu/)

ANSC 5900 - Animal Welfare Science Journal Club (1 Credit)
This course will provide students with an opportunity to select, critically evaluate, and discuss current scientific literature and to expand their understanding of the science of animal welfare. Students will meet once a week with the instructor for a journal club-style discussion. Papers will be selected by that week's student presenter (and approved by the instructor) from a provided list of current issues of several animal welfare journals. Group discussions will focus on the merits of the research presented, validity and relevance of the findings, and the significance of the work in the field. Two structured lectures will begin the course and will cover topics including: choosing a scientific article, evaluating study design, interpreting figures, basic statistics, and how to present in a journal club setting.
Enrollment Information: Enrollment limited to: graduate students.
Last Four Terms Offered: Spring 2024, Spring 2023, Spring 2022
Learning Outcomes:
- Select scientific journal articles to further their understanding of a subject of interest.
- Critically evaluate scientific literature, including analysis of: literature reviews; study design; basic statistical analyses; whether conclusions are supported by sufficient evidence.
- Discuss current scientific literature in a thoughtful manner.
- Explain scientific findings to their peers.
- Describe recent advances in understanding in the field of animal welfare science.

Schedule of Classes (https://classes.cornell.edu/)

ANSC 5920 - Mechanisms of Animal Growth and Development (2 Credits)
A course on the basic biology of animal growth and development. The course relies on data obtained from a variety of species to describe whole animal growth patterns through life and the molecular and cellular mechanisms underpinning the formation of key tissues. Lectures cover (1) patterns of whole-animal growth during fetal and postnatal life; (2) molecular and cellular basis of formation and development of skeletal muscle, adipose tissue, and bone; (3) regulation of growth and development by hormones and growth factors.
Prerequisites: introductory physiology courses.
Last Four Terms Offered: Spring 2025, Spring 2023
Learning Outcomes:

- Describe animal growth from embryonic life to maturity. Contrast the growth of individual tissues over time. Use this information to explain changes in body composition throughout life.
- Be familiar with the major developmental events leading to the formation of skeletal muscle and adipose tissue.
- Understand the role of major transcription factors in control of differentiation and growth of skeletal muscle and adipose tissue.
- Name the major components of the growth hormone (GH) -insulin-like growth factor-I (IGF-I) and leptin systems. Understand the role of each system in coordinating specific aspects of growth (e.g., linear growth for the GH-IGF system; energy partition and lipid deposition for the leptin system).
- Explain how events occurring during fetal life can exert long lasting effects after birth. Trace these long-lasting effects to specific mechanisms taking place during fetal or early postnatal life.
- Evaluate the scientific literature in one area of high interest to biology of growth and articulate deeper knowledge in this area through a research proposal.

Schedule of Classes (https://classes.cornell.edu/)

ANSC 6040 - Data Science Applications in Agriculture (4 Credits)
This course provides an experience in challenge-based learning, focusing on data-driven problems in the agricultural sector. Students work in collaborative teams, engaging with farmers and industry stakeholders to understand real-world challenges and develop innovative solutions. Students will use various digital tools essential for modern data science. Key topics include data governance, privacy, collection methods, storage solutions, processing techniques, and advanced visualization. Students will also learn data modeling and effective data presentation. Project management is a core component, teaching students to manage projects, meet deadlines, and deliver timely results. The course emphasizes teamwork, communication, and collaboration, preparing students for diverse and dynamic environments. This course is ideal for those interested in applying data science to real-world problems and making a tangible impact in agriculture.
Prerequisites: A statistical course such one of the following: STSCI 2150: Introductory Statistics for Biology, BTRY3010: Biological Statistics I, ILRST 2100: Introductory Statistics.
Learning Outcomes:

- Explain the fundamentals of data science and digital agriculture including their interdisciplinary challenges.
- Implement the various data science technologies, precision farming techniques and digital tools used in modern agriculture.
- Conduct data collection, visualization, analysis, and interpretation within the context of digital agriculture.
- Acquire practical skills through hands-on programming activities.
- Explore the applications of machine learning and artificial intelligence in agriculture.
- Recognize the significance of, and apply, data privacy and security techniques in digital agriculture.

Schedule of Classes (https://classes.cornell.edu/)

ANSC 6110 - Integrated Cattle Nutrition (4 Credits)
Integrates concepts of cattle nutrition and farm nutritional management to help students understand and appreciate factors influencing the performance of cattle under diverse conditions. Topics include the effect of environment on maintenance costs; the nutrient requirements for various stages of growth, lactation, and pregnancy; rumen function; feed composition and chemistry; nutrient partitioning; and the environmental impacts of cattle and how to minimize them. Computer models (Cornell Net Carbohydrate and Protein System) are used in the laboratory to actualize the information presented in lectures. Herd case studies are used in lab and there are field trips to farms to evaluate the nutritional management.
Enrollment Information: Enrollment limited to: graduate students.
Exploratory Studies: (CU-SBY)

Last Four Terms Offered: Fall 2024, Fall 2023, Fall 2022, Fall 2021
Learning Outcomes:

- Cultivate skills for cattle diet construction and evaluation using software that allows for the determination of first limiting nutrients.
- Articulate how nutrient metabolism can affect health and productivity of cattle.
- Apply concepts of feed chemistry, microbial growth and rumen function to reduce the environmental impact of milk and meat production while optimizing economic productivity.
- Explain the metabolic regulation and change in nutrient requirements when animals move from one physiological state to another.
- Integrate quantitative thinking to nutritional problem solving and gain an appreciation for modeling approaches to solving problems in animal agriculture.

Schedule of Classes (https://classes.cornell.edu/)

ANSC 6120 - Whole-Farm Nutrient Management (4 Credits)
Provides students with an understanding of the concepts and practices underlying whole-farm nutrient management planning of livestock and dairy farms. Improving profitability and efficiency are key factors considered while improving air and water quality associated with dairy production. Students learn about nutrient management on (Concentrated) Animal Feeding Operations ((C)AFO's) and conduct a whole farm nutrient balance for a farm of choice. This course integrates crop and manure management with nutrition and herd management to provide a broad but focused and action-oriented approach. The course utilizes three software programs for nutrient management planning and herd nutritional management: Cropware, the Cornell Net Carbohydrate and Protein System (CNCPS), and the Whole Farm Nutrient Mass Balance program. Current topics are also discussed, such as greenhouse gas emissions and impacts of dairy and livestock production and local versus global food production and environmental impacts.
Enrollment Information: Enrollment limited to: graduate students.
Last Four Terms Offered: Spring 2025, Spring 2024, Spring 2023, Spring 2022
Learning Outcomes:

- Describe the current environmental policies for agriculture and environmental management nationwide and in New York and explain the reasons the having such policies in place Discuss and debate the importance of and benefits of nutrient management and whole farm planning for the agricultural industry.
- Explain the components of a certified nutrient management plan and demonstrate understanding of nutrient management planning in conversations with planning and plan evaluation professional in the industry.
- Evaluate and compare the whole farm planning and management system of a farm from soil to crops to cows and back, and recommend changes for improvements in agriculture and environmental management in future years.
- Identify the importance of agricultural industry involvement in addressing production and environmental challenges and setting policy and constructively communicate with and debate with policy makers.
- Describe the role dairy cattle play in utilizing byproducts of the human food chain that contribute to reducing the environmental impact of all human food production.

Schedule of Classes (https://classes.cornell.edu/)

ANSC 6190 - Division of Nutritional Sciences Seminar (1 Credit)
Crosslisted with NS 6190
Lectures on current research in nutrition.
Enrollment Information: Enrollment limited to: graduate level students. Others may request a space with permission of instructor.
Last Four Terms Offered: Spring 2025, Fall 2024, Spring 2024, Fall 2023
Schedule of Classes (https://classes.cornell.edu/)

ANSC 6200 - Nutrition of Cats and Dogs (3 Credits)
The purpose of this course is to provide students with a solid foundation of knowledge on cat and dog nutrition to prepare them for careers in animal nutrition research, veterinary medicine, and the pet food industry. The course is divided into 5 modules. The first part of the course discusses ingredient and nutrient requirements of felids and canids by teaching students to integrate knowledge of evolutionary feeding habits, gastrointestinal anatomy, digestive processes, and nutrient metabolism. The second part covers practical feedings through the teaching of feed ingredient sourcing and processing, and the pet food manufacturing regulations. The third focusses on metabolic disorders of nutrient metabolism. Learning activities consist of daily student reflections, designing hypothesis-driven questions, discussing peer-reviewed articles, and presenting a final project.
Prerequisites: ANSC 2120.
Last Four Terms Offered: Fall 2024, Fall 2023, Fall 2022, Fall 2021
Learning Outcomes:

- Evaluate ingredient and nutrient adequacy of commercial foods for domestic felids and canids.
- Evaluate best feeding practices for a domestic felid and canid with a given common underlying metabolic disorder.
- Design a complete feed for a domestic felid and canid.

Schedule of Classes (https://classes.cornell.edu/)

ANSC 6220 - Graduate Student Research Updates (1 Credit)
This course is designed to train Animal Science graduate students in communication/presentation skills needed to support a career in scientific research. Each student will present an update on research progress/plan towards his or her dissertation/thesis. Advice, feedback and peer-evaluation will be provided to each presenter. Focused discussions examining research areas of particular interest to each student on research methods, existing theories and/or controversies will be considered. This course also aims to foster collegiality, expand knowledge and promote professional development among graduate students in a broad context within this diverse field.
Enrollment Information: Enrollment limited to: Animal Science graduate students.
Last Four Terms Offered: Spring 2025, Fall 2024, Spring 2024, Fall 2023
Learning Outcomes:

- Improve oral presentation skills, organization, and delivery of their specific research topic to a diverse audience.
- Develop the confidence to clearly and succinctly communicate research findings to the scientific community.
- Hone interdisciplinary and critical thinking skills among Animal Science graduate students.
- Develop skills to critique (constructively) and scientifically interact with peers and departmental faculty.
- Get a broad perspective of Animal Science research by discussing diverse topics that are presented in this series (disciplinary knowledge).

Schedule of Classes (https://classes.cornell.edu/)

ANSC 6230 - Reproductive Biology Journal Club (1 Credit)
This course offers students with strong interest in reproductive biology a platform to extend the depth and breadth of their knowledge in reproductive science and technology. It also provides an opportunity for students to advance their critical assessment of current literature, and to practice scientific presentation in reproductive biology.
Enrollment Information: Enrollment limited to: graduate students and senior undergraduate students.
Last Four Terms Offered: Fall 2024, Fall 2023, Fall 2022, Fall 2021
Learning Outcomes:

- Critically explain the strength and weakness of published research and literature.
- Effectively communicate analytical processes and their subsequent conclusions and predictions.

Schedule of Classes (https://classes.cornell.edu/)

ANSC 6270 - Fundamentals of Endocrinology (3 Credits)
Crosslisted with BIOAP 6270
Physiology and regulation of endocrine secretions. Emphasizes neuroendocrine, reproductive, growth, and metabolic aspects of endocrinology. Examples are selected from many animals, including humans.
Prerequisites: BIOAP 1100 or BIOG 1440, or permission of instructor.
Last Four Terms Offered: Fall 2024, Fall 2023, Fall 2022, Fall 2021
Learning Outcomes:

- Define the organization of the endocrine system with a focus on mammals.
- Explain the physiological function of major hormones and interactions among components of the endocrine system to control homeostasis.
- Describe the cellular source, biosynthesis, chemical nature, storage, factors controlling its secretion, cellular mechanisms of action on target cells, and physiological functions for each major hormone.
- Predict the consequences of disturbances in components of the endocrine system.
- Illustrate how basic scientific research as well as clinical studies of endocrine disorders contribute to the advancement of basic knowledge and development of therapeutic strategies for endocrine disorders.
- Appraise how the acquisition of knowledge about the endocrine system is ongoing and how key advances in technology from multiple fields (physiology, cell biology, biochemistry, and genetics) have promoted advancements in knowledge of the endocrine system.

Schedule of Classes (https://classes.cornell.edu/)

ANSC 6280 - Comparative Nutrition of the Horse and Pig (3-4 Credits)
Throughout their evolution, members of the Suidae family have adopted omnivorous feeding strategies of great elasticity. They share similar gastrointestinal physiological traits with the Equidae family members, which have remained strict obligate herbivores. Learning nutrition of the domestic horse and pig under the same umbrella offers a way to exploit their differences and similarities and understand the underlying factors that dictate their nutrient and feed requirements. The course covers the following topics using a comparative approach between the two species: gastrointestinal anatomy and digestive processes, feed ingredients and composition, feeding behavior and management, and diet-induced metabolic disorders. Learning activities include discussions, weekly journaling, monthly short research papers, gastrointestinal tract dissections, diet evaluation and formulation, field trips, and hands-on feeding trial(s).
Prerequisites: BIOAP 1100, ANSC 2120, and ANSC 2650.
Last Four Terms Offered: Spring 2025, Spring 2024, Spring 2023, Spring 2022
Learning Outcomes:

- Recommend best feeding practices to maintain health and wellbeing of horses and pigs.
- Formulate a simple diet for a pig at a given stage of life cycle.
- Formulate a simple diet for a horse at a given stage of life cycle.
- Evaluate the nutritional adequacy of a given equine and swine diet.

Schedule of Classes (https://classes.cornell.edu/)

ANSC 6290 - Management of Nutrient Disorders in Cats and Dogs (1 Credit)
While many subjects are covered in ANSC 4200, offered in the fall, there is limited time to address all of the current topics in cat and dog nutrition. This course provides a unique opportunity for students to explore disorders of nutrient metabolism in greater depth, either associated with specific breeds or resulting from mismanaged nutrition. Each week, a different disorder will be studied, covering a total of 13 disorders. These include but are not limited to: copper storage diseases, vitamin B12 malabsorption, obesity and type 2 diabetes, hyperlipidemia, lipoprotein lipase deficiency in cats, feline hepatic lipidosis, calcium and phosphorus imbalances, and urolithiasis.
Enrollment Information: Enrollment limited to: juniors and seniors.
Last Four Terms Offered: Spring 2025, Spring 2024, Spring 2022
Learning Outcomes:

- Explain the most common disorders associated with nutrient metabolism in cats and dogs.
- Describe nutritional management strategies to mitigate the health impacts of these disorders.
- Evaluate commercial therapeutic diets with health claims.

Schedule of Classes (https://classes.cornell.edu/)

ANSC 6310 - Applied Dairy Cattle Genetics (2 Credits)
Course will review the current knowledge base of dairy cattle genetics including the genetic regulation of diseases, production and health traits. Genomic evaluation scores will be assessed with an emphasis on how to prioritize and balance genetic selection towards long-term sustainability. Mating strategies will be evaluated for the achievement of goals and impact on both the individual animal and overall herd.
Last Four Terms Offered: Spring 2025, Spring 2023
Learning Outcomes:

- Describe how marker assisted selection and heritability measurements are used.
- Critically evaluate dairy cattle evaluation scores: a. Explain how they are produced and weighted.
- Prioritize and balance selection criteria, including both health and production traits, towards species/breed management and long-term sustainability.
- Develop mating strategies to achieve producer goals: a. Predict effect of AI within mating strategies b. Compare and contrast commercial mating programs c. Apply mating strategies using genomic selection d. Predict short and long-term effects on population.

Schedule of Classes (https://classes.cornell.edu/)

ANSC 6400 - Graduate-Level Individual Study in Animal Science (1-4 Credits)
Graduate individual study in Animal Science under the direction of one or more faculty members.
Last Four Terms Offered: Spring 2025, Fall 2024, Spring 2024, Fall 2023
Schedule of Classes (https://classes.cornell.edu/)

ANSC 6410 - Metabolic Physiology (3 Credits)
The course will integrate animal nutrition, biochemistry, and physiology. The overall goal is to enhance understanding of intermediary metabolism and metabolic adaptations that develop to support different physiological states. The comparative study of biochemistry across mammalian species will be emphasized. The structural and functional roles of biochemicals and the ability of hormones to influence their metabolic fate will be highlighted.
Prerequisites: BIOAP 1100, ANSC 2120 or equivalents.
Enrollment Information: Enrollment limited to: graduate students.
Last Four Terms Offered: Spring 2025, Spring 2024, Spring 2023, Spring 2022
Learning Outcomes:

- Integrate basic and complex metabolic pathways that converge to maintain energy homeostasis and life in mammals.
- Identify shifts in metabolism that develop to support changes in physiological states such as starvation, growth, pregnancy, and lactation.
- Define the relationship between nutrition and metabolism with an emphasis on anabolic and catabolic reactions that are specific for unique tissues.
- Compare and contrast nutritional physiology and biochemistry in various mammalian species with conserved metabolic adaptations to support their survival in unique environments.
- Recognize the critical role of endocrine hormones on energy metabolism.
- Define key intracellular signaling pathways that fundamentally link endocrine hormones with their metabolic action.
- Apply concepts of processes of nutritional physiology and biochemistry within the context of contemporary animal production challenges that influence health and performance.

Schedule of Classes (https://classes.cornell.edu/)

ANSC 6510 - Dairy Herd Business Management (4 Credits)
Emphasizes dairy herd business management with application to herd management analysis. Laboratory includes farm tours and analysis.
Enrollment Information: Enrollment limited to: graduate students.
Exploratory Studies: (CU-CEL)

Last Four Terms Offered: Fall 2024, Fall 2023, Fall 2022, Fall 2021
Learning Outcomes:

- Develop critical thinking and verbal communication skills in business and financial decision making.
- Develop group-based business outcomes through classroom discussion and interaction in support of their decision-making process.
- Interact with dairy farm families and employees and analyze financial data to identify and solve real-life problems.

Schedule of Classes (https://classes.cornell.edu/)

ANSC 6700 - Immunology in Animal Health and Disease (3 Credits)
This course offers a comprehensive overview of the immune system, from its fundamental components to its intricate responses to various threats. The curriculum begins with a foundation in the diverse mechanisms underlying both innate and adaptive immune responses. Students will then engage in case-based studies that integrate and advance both fundamental and applied aspects of immunology, tailored to the essentials of pre-veterinary and production agriculture students.
Prerequisites: BIOAP 1100 or BIOG 1440.
Last Four Terms Offered: Spring 2025, Spring 2024, Spring 2023, Spring 2022
Learning Outcomes:

- Explain the role of the immune system and identify the types of threats it defends against.
- Analyze the roles of different immune cells and their modalities in maintaining immunity.
- Correlate different mechanisms in an immune response to the various pathogen classes and other triggers.
- Discuss the mechanisms behind vaccines and immune-based treatments.
- Apply core immunological principles to understand veterinary cases of diseases/disorders.
- Cultivate informed perspectives regarding applied immunology in domestic animals.

Schedule of Classes (https://classes.cornell.edu/)

ANSC 6880 - Global Food, Energy, and Water Nexus — Engage the US, China, and India for Sustainable Future (3-4 Credits)
Crosslisted with FDSC 6880, AEM 6880, CHEME 6780, CEE 5820, GDEV 6880
This course is offered by six Departments at Cornell, in collaboration with five Universities in China and one India. Video conferencing will be used to connect classrooms in the three countries in real time. Important issues related to the food, energy, and water nexus and its implications for nutrition security, one health, environmental sustainability, climate change, and economic development in the US and these two countries will be described. Challenges associated with these issues will be evaluated and strategies to address them will be proposed. Engagement of these countries with each other and the rest of the world will be explored. The course serves as a platform for students from Cornell, China, and India to learn from and interact with each other in the same class, and to share their thinking, creativity, and perspectives on these issues.
Enrollment Information: Enrollment limited to: graduate student status, or permission of the instructors.
Last Four Terms Offered: Fall 2024, Fall 2023, Fall 2022, Fall 2021
Learning Outcomes:

- Identify and compare the major food, nutrition and health, energy, water, and economic challenges facing the US, China, and India.
- Describe barriers to food and nutrition security for all people in each of the three countries and globally and propose solutions for overcoming these barriers.
- Identify and quantify the requirements of energy and water for producing, processing, transporting, and/or preparing food.
- Evaluate various predictions of regional and global impacts of climate change on agricultural production and human health in the 21st century.
- Collaborate as members of interdisciplinary teams composed of students from the US, China, and India to analyze and solve problems that affect food, water, and energy security.
- Effectively and respectfully debate, with people of opposing views, issues related to food, water, and energy nexus.
- Prepare and deliver focused, clear, impactful, and culturally sensitive presentations to an international audience of peers.

Schedule of Classes (https://classes.cornell.edu/)

ANSC 6940 - Special Topics in Animal Science (1-4 Credits)
The department teaches trial courses under this number. Offerings vary by semester and are advertised by the department before the semester begins. Courses offered under the number will be approved by the department curriculum committee, and the same course is not offered more than twice under this number.
Enrollment Information: Enrollment limited to: graduate students.
Last Four Terms Offered: Fall 2021, Fall 2019, Fall 2018, Fall 2016
Schedule of Classes (https://classes.cornell.edu/)

ANSC 7570 - Current Concepts in Reproductive Biology (3 Credits)
Crosslisted with BIOAP 7570
This course offers students who have already obtained fundamental knowledge in reproductive biology an opportunity to gain in-depth understanding of specific topics in reproductive science and technology. This course also aims to advance students' skill in critical thinking and assessing of literature, as well as in formulating hypotheses in emerging research areas of reproductive biology. Examples of topics covered in this course include central nervous system control of reproduction, gametogenesis, sex differentiation, ovarian biology, uterine function, placental biology, reproductive immunity and infertility.
Enrollment Information: Enrollment limited to: graduate students; senior undergraduate students may enroll with permission of instructor.
Last Four Terms Offered: Fall 2024, Fall 2022, Fall 2020, Fall 2017
Schedule of Classes (https://classes.cornell.edu/)

ANSC 7900 - Graduate-Level Thesis Research (1-12 Credits)
Thesis research for Ph.D. students only before A exam has been passed.
Enrollment Information: Enrollment limited to: students in a Ph.D. program only before A exam has been passed.
Last Four Terms Offered: Spring 2025, Fall 2024, Spring 2024, Fall 2023
Schedule of Classes (https://classes.cornell.edu/)

ANSC 8900 - Master's Level Thesis Research (1-12 Credits)
Thesis research for master's students.
Enrollment Information: Enrollment limited to: students admitted specifically to a master's program.
Last Four Terms Offered: Spring 2025, Fall 2024, Spring 2024, Fall 2023
Schedule of Classes (https://classes.cornell.edu/)

ANSC 9900 - Doctoral-Level Thesis Research (1-12 Credits)
Thesis research for Ph.D. candidates after A exam has been passed.
Enrollment Information: Enrollment limited to: students admitted to candidacy after A exam has been passed.
Last Four Terms Offered: Spring 2025, Fall 2024, Spring 2024, Fall 2023
Schedule of Classes (https://classes.cornell.edu/)