SCHOOL OF ANIMAL SCIENCES

Our Website (http://www.apsc.vt.edu)

Overview

The School of Animal Sciences offers two degree programs (Animal and Poultry Sciences and Dairy Science) as well as several options within each degree. With expert faculty in fields and species across the animal sciences, our students are well-trained in science-based education and hands-on learning for careers in the animal sciences as well as graduate and professional schools, such as veterinary school.

Degree Programs

Animal and Poultry Sciences

The Animal and Poultry Sciences degree provides students with a broad science-based education tailored to meet their needs and career goals. The program prepares students for careers in livestock, poultry, and equine industries, and with companion animals, laboratory animals, agribusiness, research, and teaching. The curriculum also provides preparation for professional schools including veterinary medicine, medical school and other health professions, as well as graduate school. This major combines education in the basic sciences of animal nutrition, genetics, and physiology with management principles as applied to the raising and merchandising of beef cattle, horses, poultry, sheep, swine, and their products, as well as pets and other companion animals. Students are encouraged to participate in independent studies, undergraduate research, and internship programs. Study abroad opportunities are also available.

Animal and Poultry Sciences Options

The Animal and Poultry Sciences curriculum allows students to tailor their education to their academic and career goals. The APSC major broadly prepares students for careers related to animal management and production, health and wellbeing. For students interested in tailoring their degree, two options are available (choose one):

- Pre-vet option: Prepares students for post-graduate education such as veterinary, medical, pharmacy, and other professional schools.
- Behavior and Welfare option: Designed for students with interests in the science and applications of animal welfare and behavior.

Animal and Poultry Sciences Minors

Two minors are offered in the Animal and Poultry Sciences program: Animal and Poultry Sciences and Equine Science. Both minors require a minimum of 18 credits. Minor checksheets can be found at the following website - https://www.registrar.vt.edu/graduation-multi-brief/checksheets.html.

Dairy Science

The purpose of the Dairy Science degree is to offer students the opportunity to prepare themselves for a wide variety of careers by developing their technical and interpersonal skills. We offer a challenging yet flexible curriculum that can be individualized to meet the educational needs and interests of each student, counseling to assist each student in designing individual programs, and extracurricular activities to enhance development of interpersonal skills.

Dairy Science Options

Students may select from three curricula: Dairy Business Management, Science/Pre-Veterinary, and Dual Emphasis. All options provide students with the opportunity to acquire a broad education in the sciences, social sciences, economics, mathematics, and communications while learning the basic principles of dairy enterprise management.

- Dairy Business Management option: This is the most flexible curriculum, with at least 30 credits of electives. Suited to students with an interest in various fields of dairy production (herd manager, farm manager), allied agri-business industries (feed, genetics, equipment), agricultural communications, public relations, extension, breed field person, and a variety of other positions. Graduates in this option have also gone on to careers in college instruction, elementary school instruction, bank investment management, feed sales, and milk marketing, to name a few.
- Dual option: This is recommended for students who plan to concentrate in more than one academic area as they prepare for future careers. Common minors and double majors that students may earn while completing their Dairy Science degree requirements include Agricultural Economics, Animal and Poultry Sciences, Biology, Crop and Soil Environmental Sciences, Spanish, Communications, Professional and Technical Writing, etc.
- Science Pre-Vet option: This option is recommended for students who plan to continue into veterinary college or other graduate or professional schools, or who plan a career in quality control, laboratory work, or research and product development. It provides an excellent base in chemistry, mathematics, physics, biology and biochemistry for advanced study in many areas. Students are encouraged and mentored to apply for early admission to veterinary school.

Opportunities to Excel in Dairy Science

Nearly all Dairy Science students complete a second major or minor and they are encouraged to actively participate in extracurricular clubs, judging teams and the dairy management team. Ninety five percent of students complete at least one internship prior to graduation and nearly half complete undergraduate research, an independent study, or serve as a teaching assistant.

Active participation in research projects in lactation, genetics, nutrition, nutrient management, and management provide qualified students valuable research experience with departmental scientists as well as part-time employment opportunities. These opportunities are available to students in all options and enhance their preparation for advanced study and provide a better understanding of the research process.

Requirements for a Dairy Science Minor

Students may minor in Dairy Science. The minor requires the completion of a total of 19 credit hours. Courses that may be taken for the minor are listed on the minor checksheet found on the following website - https://www.registrar.vt.edu/graduation-multi-brief/checksheets.html.

Note: Advisors work with students to individualize the course of study.

Satisfactory Progress

University policy requires that students who are making satisfactory progress toward a degree meet minimum criteria toward the General Education (Pathways) (see "Academics (https://www.undergradcatalog.registrar.vt.edu/1617/academic-policies.html)") and toward the degree.

Satisfactory progress requirements toward the specific degree can be found on the major checksheet by visiting the University Registrar website at https://www.registrar.vt.edu/graduation-multi-brief/checksheets.html.

- Animal and Poultry Sciences Major (https://catalog.vt.edu/undergraduate/agriculture-life-sciences/animal-sciences/animal-poultry-sciences-bs-science/)
- Animal and Poultry Sciences Major with Behavior and Welfare Option (https://catalog.vt.edu/undergraduate/agriculture-life-sciences/animal-sciences/animal-poultry-sciences-behavior-welfare-option/)
- Animal and Poultry Sciences Major with Prevet Option (https://catalog.vt.edu/undergraduate/agriculture-life-sciences/animal-sciences/animal-poultry-sciences-prevet-option/)
- Dairy Science Major with Dairy Business Management Option (https://catalog.vt.edu/undergraduate/agriculture-life-sciences/animal-sciences/dairy-science-bs-dairy-business-management/)
- Dairy Science Major with Dual Emphasis Option (https://catalog.vt.edu/undergraduate/agriculture-life-sciences/animal-sciences/dairy-science-dual-emphasis/)
- Dairy Science Major with Science/Prevet Option (https://catalog.vt.edu/undergraduate/agriculture-life-sciences/animal-sciences/dairy-science-bs-science-prevet/)

Director: D. E. Gerrard
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Colonel Horace E. Alphin Professor of Dairy Science: K. F. Knowlton
David R. and Margaret Lincicome Professor of Agriculture: M. D. Hanigan[6]
Paul Mellon Distinguished Professor of Agriculture: S. E. Johnson
John W. Hancock Professor: M. E. Persia
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Associate Professor of Practice: J. S. Bedore and M. Miller
Assistant Professor of Practice: K. J. Heiderscheit
A/P Faculty: M. Arant, K. Carter, T. Golightly, H. Liles, and B. Sheely
Advanced Instructor: L. Bergamasco and W. A. White
Lecturer: D. R. Winston
Research Associate Professor: T.H. Shi
Research Assistant Professor: E.T. Helm
Career Advisors: J. S. Bedore, L. Bergamasco, E.T. Helm, , D. E. Eversole, K. J. Heiderscheit, K. F. Knowlton, M. Miller, D. R. Winston, and C. M. Wood

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Footnotes:

1 Award for Excellence in Undergraduate Advising
2 Academy of Teaching Excellence inductee
3 Wine Award recipient
4 Sporn Award recipient
5 Alumni Award for Extension Excellence
6 Alumni Award for Research Excellence
7 Alumni Award for Teaching Excellence
8 Academy of Faculty Service
9 Commonwealth of Virginia Outstanding Faculty Award
10 Diggs Teaching Scholar Awards

Undergraduate Course Descriptions (APSC)

APSC 1454 - Introduction to Animal and Poultry Science (3 credits)
Survey of systems of livestock and poultry production including: concepts and terminology pertaining to management and marketing; types and breeds of livestock and poultry; and an introduction to nutrition, genetics, physiology, and management of beef cattle, horses, sheep, swine and poultry.
Corequisite(s): APSC 1464
Instructional Contact Hours: (3 Lec, 3 Crd)

APSC 1464 - Animal and Poultry Science Laboratory (1 credit)
Management practices and concepts related to efficient livestock and poultry production and marketing are taught through demonstrations and hands-on experience.
Corequisite(s): APSC 1454
Instructional Contact Hours: (3 Lab, 1 Crd)

APSC 1504 - Animal and Poultry Sciences First Year Experience (1 credit)
Orientation course for freshman and transfer APSC students providing skills, resources and fundamental knowledge to enhance learning experiences and support success. Skills, resources, opportunities, curriculum, and career planning. Emphasis on inquiry, problem-solving skills, critical thinking and integration of ideas and experiences to encourage life-long learning.
Instructional Contact Hours: (1 Lec, 1 Crd)

APSC 1524 - Beginning Equitation (1 credit)
Beginning work in equitation, the science of horseback riding. The five natural aids of the rider and rein aides. Secure positions of the rider's leg and seat at the walk, trot, and canter. Basic leg and seat position for jumping. Concepts of horse welfare, health, behavior, and communication pertaining to horseback riding. The German training scale, including rhythm, relaxation, connection, impulsion, straightness, and collection of the horse. Use of small cavaletti obstacle courses to improve horse strength and straightness. Grooming techniques, hoof care, and tack conditioning for equitation horses. Position emphasis will be on the forward riding seat and elementary dressage movements. COURSE FEE $1,500
Instructional Contact Hours: (3 Lab, 1 Crd)

APSC 1984 - Special Study (1-19 credits)
Instructional Contact Hours: Variable credit course

APSC 2004 - Animal and Poultry Sciences Seminar (1 credit)
Identification of primary and secondary career objectives for Animal and Poultry Science majors; planning for completion of a capstone learning experience in the major. Identification of curricular and extracurricular activities to increase career opportunities. Improvement of professional and technical writing skills applicable to the animal sciences field.
Prerequisite(s): APSC 1504
Instructional Contact Hours: (1 Lec, 1 Crd)

APSC 2104 - Poultry Laboratory (1 credit)
Anatomy and physiology of birds including species-specific specializations in anatomical structure and body composition, musculoskeletal, respiratory, reproductive, endocrine, digestive and urinary systems. Relationship of these concepts to growth and egg production. Includes handling live birds.
Prerequisite(s): APSC 1454 and APSC 1464
Corequisite(s): ALS 2304
Instructional Contact Hours: (3 Lab, 1 Crd)

APSC 2114 - Livestock Management and Handling (1 credit)
Safety in livestock handling; animal behavior; care, housing, and managerial practices related to beef cattle, sheep, and swine taught through experiential activities.
Prerequisite(s): APSC 1454 and APSC 1464
Instructional Contact Hours: (3 Lab, 1 Crd)

APSC 2124 - Horse Handling Practicum (2 credits)
Stable management, haltering and leading horses, equine vital signs, and hoof care. Identification of horses by coat colors and markings. Breed characteristics of horses. Equine behaviors. Types and amounts of feed and forages commonly fed to horses. Anatomical parts of the horse. Careers in the horse industry and sports in which horses participate. Involvement with daily management and handling of the campus equitation and breeding horses.
Instructional Contact Hours: (1 Lec, 3 Lab, 2 Crd)

APSC 2164 - Companion and Laboratory Animal Care and Handling (1 credit)
Brief history of companion and laboratory animals. Outline of the major anatomical and physiological characteristics, first aid and basic care. Principles of husbandry and handling techniques. Institutional Animal Care and Use Committee training.
Prerequisite(s): APSC 1454 and APSC 1464
Instructional Contact Hours: (2 Lab, 1 Crd)

APSC 2424 - Introduction to the Equine Industry (3 credits)
Introduction to the horse and equine industry. Survey of breeds and conformation; breeding, management, equipment, facilities, and marketing of the successful horse operation.
Instructional Contact Hours: (3 Lec, 3 Crd)

APSC 2524 - Intermediate Equitation (1 credit)
Intermediate work in horseback riding with special emphasis on development of the forward seat and skills required for jumping. Elementary dressage movements. COURSE FEE: $1,500.
Prerequisite(s): APSC 1624
Instructional Contact Hours: (4 Lab, 1 Crd)

APSC 2574 - Domesticated Animal Behavior (3 credits)
Behavioral systems, social behavior, learning, and cognition of domesticated animals. Ethological and psychological approaches to, and ultimate and proximate methods of, studying behavior. Evolutionary processes and natural selection, genetics and epigenetics, and neural and physiological mechanisms of behavior.
Prerequisite(s): APSC 1454 or BIOL 1105
Instructional Contact Hours: (3 Lec, 3 Crd)

APSC 2624 - Beginning Equitation Over Fences (1 credit)
Introduction of jumping skills for the unskilled as well as review of jumping skills for experienced riders. Rider should have skills at trot and canter. COURSE FEE: $1,500.
Prerequisite(s): APSC 2524
Instructional Contact Hours: (4 Lab, 1 Crd)

APSC 2714 - Design of Precision Animal Agricultural Systems (3 credits)
Design methods, interpretation, and historical context of precision animal agriculture systems, including technologies, networking, sensors, and data analytics. Elements of animal production systems designed with precision animal agriculture technologies. Advantages and disadvantages of traditional and technology-enhanced production systems. Impacts of precision system design on economics and environmental impacts of animal agriculture and wellbeing. Data acquisition, pipelines, and analytics that link data with decision making. Design of connected systems.
Pathway Concept Area(s): 6D Critique & Prac in Design, 10 Ethical Reasoning
Instructional Contact Hours: (3 Lec, 3 Crd)

APSC 2824 - Equine Conformation and Biomechanics (2 credits)
Evaluation of equine conformation as related to locomotion, athletic performance and soundness. Basic understanding of breed standards, gaits, and rules and regulations pertaining to various equine sports disciplines, from both domestic and global perspectives. Investigation of current scientific literature regarding equine conformation and biomechanics.
Instructional Contact Hours: (1 Lec, 2 Lab, 2 Crd)

APSC 2964 - Field Study (1-19 credits)
Instructional Contact Hours: Variable credit course

APSC 2974 - Independent Study (1-19 credits)
Instructional Contact Hours: Variable credit course

APSC 2984 - Special Study (1-19 credits)
Instructional Contact Hours: Variable credit course

APSC 2994 - Undergraduate Research (1-19 credits)
Instructional Contact Hours: Variable credit course

APSC 3024 - Equine Science and Management (3 credits)
Management of horses at maintenance, in light work, and breeding stock. Conformation, forages and concentrate requirements, common diseases and health conditions, health maintenance, vaccination and deworming protocols, behavioral modification and training practices, facility management, breeding practices, and welfare. Career paths in the horse industry. Emphasis on application and analysis of case studies.
Prerequisite(s): APSC 2124
Instructional Contact Hours: (2 Lec, 3 Lab, 3 Crd)

APSC 3064 - Companion and Laboratory Animal Science (3 credits)
Comparative aspects of companion and laboratory animals including physiology, anatomy, nutrition, genetics and reproduction. Normal behaviors along with techniques of behavior modifications.
Prerequisite(s): ALS 2304
Instructional Contact Hours: (3 Lec, 3 Crd)

APSC 3134 - Animal Agriculture and the Environment (3 credits)
Environmental issues associated with animal agriculture. Nutrient contamination of water resources, odor emission from livestock farms, environmental regulations affecting animal agriculture, and management practices to reduce the impacts of livestock farms on air and water quality.
Instructional Contact Hours: (3 Lec, 3 Crd)
Course Crosslist: DASC 3134

APSC 3214 - Principles of Meat Science (3 credits)
Muscle biology and biochemistry, fresh meat processing, meat merchandising, processed meats, food safety, meat cookery, and regulations.
Prerequisite(s): ALS 2304 and CHEM 1036
Instructional Contact Hours: (3 Lec, 3 Crd)
Course Crosslist: FST 3214

APSC 3224 - Meat Science Laboratory (1 credit)
Harvesting of livestock, carcass fabrication into wholesale and retail cuts, fresh meat processing and cookery. Handling, processing and displaying fresh and processed beef, pork, and lamb. Applications of Hazard Analysis Critical Control Point (HACCP) and food safety concepts to meat processing environments.
Corequisite(s): APSC 3214
Instructional Contact Hours: (3 Lab, 1 Crd)

APSC 3254 - Animal Products (3 credits)
Products obtained from animals (meat, eggs, dairy, by-products). Effect of production and processing of food animals upon product safety and quality.
Prerequisite(s): ALS 2304
Instructional Contact Hours: (2 Lec, 2 Lab, 3 Crd)

APSC 3334 - Animal Welfare and Bioethics (3 credits)
Historical overview of animal welfare and bioethics. Animal welfare issues in farm and companion animals with respect to their use and treatment in the United States and in the global community. The influences of animal protection organizations, consumer groups, politicians, the scientific community, and other stakeholders on the development and enforcement of policies. Pre: Junior Standing.
Prerequisite(s): APSC 1454 and ALS 2304
Instructional Contact Hours: (3 Lec, 3 Crd)

APSC 3434 - Host Microbe Interactions (3 credits)
Microbes and their physiology in animal production. Host-microbe interactions at a cellular/system level. Microbial pathogenesis, microbiome, and metabolism in animal health. Cellular responses to microbe colonization of its animal host. Relate microbial metabolism with diet and animal growth and development. Examine the underlying mechanism behind disease or health resulting from microbe interactions.
Prerequisite(s): ALS 2304
Instructional Contact Hours: (3 Lec, 3 Crd)

APSC 3504 - Poultry Science and Health (3 credits)
Avian embryology and physiological systems, poultry genetics, microbiome, diseases, biotechnology, health and welfare. Social and economic issues facing the poultry industry.
Prerequisite(s): APSC 1454 and APSC 1464
Instructional Contact Hours: (3 Lec, 3 Crd)

APSC 3524 - Intermediate Equitation Over Fences (1 credit)
Establishment of sound jumping skills. Continuation of more advanced flat work. Study of hunter courses and cross country jumping. COURSE FEE: $1,500.
Prerequisite(s): APSC 2624
Instructional Contact Hours: (4 Lab, 1 Crd)

APSC 3624 - Advanced Equitation Over Fences (1 credit)
Advanced methods and techniques for jumping and precision riding. COURSE FEE: $1,500.
Prerequisite(s): APSC 3524
Instructional Contact Hours: (4 Lab, 1 Crd)

APSC 3684 - Special Topics in Animal and Poultry Sciences (1,2 credits)
An advanced, variable-content course which explores a topic in the animal sciences such as a significant contemporary issue; an emerging research area of interest to undergraduates; or a semester-long project involving a small group of students. May be repeated for up to three credits, no more than two credits per term.
Prerequisite(s): ALS 2304
Instructional Contact Hours: (1,2 Lec, 1,2 Crd)
Repeatability: up to 3 credit hours

APSC 3754 - Principles of Livestock Evaluation (2 credits)
Selection of market and breeding animals based on subjective and objective methods of evaluation. Basic understanding of evaluation principles, form-to-function, expected progeny differences, and performance records of beef cattle, swine, and sheep. Involves accurate decision making and oral reason presentations.
Prerequisite(s): APSC 1454
Instructional Contact Hours: (6 Lab, 2 Crd)

APSC 3764 - Livestock Merchandising (2 credits)
A comprehensive study of the principles and activities involved in successfully promoting and merchandising livestock. A livestock auction (Hokie Harvest Sale) is held at the conclusion of the course to provide experiences in advertising, salesmanship, livestock photography, facility development, sale management, and budgeting. Pre: Junior standing or consent.
Instructional Contact Hours: (2 Lec, 2 Crd)

APSC 3824 - Equine Training and Marketing (2 credits)
Application of fundamental behavioral concepts and principles to the training of horses in routine handling and groundwork. Preparation, marketing and presentation of horses for show and sale.
Prerequisite(s): APSC 2124
Instructional Contact Hours: (1 Lec, 3 Lab, 2 Crd)

APSC 3900 - Bridge Experience (0 credits)
Application of academic knowledge and skills to in a work-based experience aligned with post-graduation goals using research-based learning processes. Satisfactory completion of work-based experience often in the form of internship, undergraduate research, co-op, or study abroad; self-evaluation; reflection; and showcase of learning. Pre: Departmental approval of 3900 plan.
Instructional Contact Hours: (0 Crd)

APSC 3954 - Study Abroad (1-19 credits)
Instructional Contact Hours: Variable credit course

APSC 3964 - Field Study (1-19 credits)
Instructional Contact Hours: Variable credit course

APSC 3974 - Independent Study (1-19 credits)
Instructional Contact Hours: Variable credit course

APSC 3984 - Special Study (1-19 credits)
Instructional Contact Hours: Variable credit course

APSC 4004 - Contemporary Issues in the Animal Sciences (3 credits)
Applying critical thinking, ethical reasoning and problem solving in order to make ethical decisions in regard to important contemporary issues in animal agriculture and other areas of the animal sciences; discourse through oral and written communication.
Prerequisite(s): APSC 2004
Pathway Concept Area(s): 1A Discourse Advanced, 10 Ethical Reasoning
Instructional Contact Hours: (3 Lec, 3 Crd)

APSC 4054 - Genomics (3 credits)
A contemporary analysis of the development, utility and application of high-resolution methods for the study and manipulation of the complete genomes of organisms. The use of new techniques for genomic, metabolic and protein engineering (functional genomics), including high-throughput methods and nanotechnology, will be emphasized.
Prerequisite(s): BCHM 3114 or BCHM 4116 or BIOL 3774
Instructional Contact Hours: (3 Lec, 3 Crd)
Course Crosslist: BCHM 4054

APSC 4064 - Issues in Companion Animal Management (3 credits)
Comparative aspects of companion animals including physiology, anatomy, nutrition, genetics, reproduction and well-being. Normal and aberrant behaviors along with techniques of behavior modification and pharmacological intervention. Critical evaluation of current legal and ethical issues in the companion animal industry. Limited to dogs, cats and caged birds. Pre-requisite: Junior Standing required Pre-requisites may be waived with permission of instructor.
Prerequisite(s): APSC 2464 and ALS 3104 and ALS 2304
Instructional Contact Hours: (3 Lec, 3 Crd)

APSC 4124 - Equine Health and Disease (4 credits)
Application of principles needed to effectively monitor and manage equine herd health. Focus on information synthesis, situation assessment and decision-making skills to develop preventative care protocols and treat illness. Practical application of horse health care techniques for routine and minor emergency situations.
Prerequisite(s): ALS 2304
Instructional Contact Hours: (2 Lec, 4 Lab, 4 Crd)

APSC 4204 - Advanced Equine Nutrition and Feeding (3 credits)
Analysis, formulation, and improvement of diets fed to horses in different physiological stages and metabolic statuses. Nutrient digestion, absorption, and utilization of nutrients. Computer-based ration formulation for horses. Applying economic principles to ration formulation and communicate equine nutrition concepts.
Prerequisite(s): ALS 3204
Instructional Contact Hours: (3 Lec, 3 Crd)

APSC 4224 - Equine Exercise Physiology (3 credits)
Comprehensive study of conditioning the equine athlete using the principles of exercise physiology, energetics, kinetics, and sports medicine. Anatomy and physiology as it relates to exercise, conditioning and fitness assessment; exercise intolerance; performance nutrition; and medical practices used to support equine athletics.
Prerequisite(s): ALS 2304 and APSC 2124
Instructional Contact Hours: (3 Lec, 3 Crd)

APSC 4264 - Companion and Exotic Animal Nutrition (3 credits)
Idiosyncrasies and conformities of digestive systems and metabolic characteristics of cats, dogs, reptiles, small mammals, birds, and fish. Nutrient requirements by life-stage of cats, dogs, reptiles, small mammals, birds, and fish. Food ingredients, software-based pet food formulations, pet food labels, and regulatory frameworks. Modifications of pet food formulations for life stage and physiological conditions. Attributes of food ingredients that impact quality and nutritional value. Pet food packaging nutritional claims. Evaluation of newly emerging information and scientific literature regarding nutritional requirements of cats, dogs, reptiles, small mammals, birds, and fish.
Prerequisite(s): ALS 3204
Instructional Contact Hours: (3 Lec, 3 Crd)

APSC 4304 - Principles and Practices of Bovine Reproduction (2 credits)
Principles and techniques in reproductive physiology and herd management related to health, record keeping, estrus detection and synchronization, uterus and ovary condition. Ovarian function and superovulation, semen handling, artificial insemination and pregnancy detection are also considered.
Prerequisite(s): ALS 2304
Instructional Contact Hours: (1 Lec, 3 Lab, 2 Crd)
Course Crosslist: DASC 4304

APSC 4324 - Equine Reproduction and Neonatal Care (4 credits)
Principles and techniques in equine reproductive physiology and endocrinology. In-depth examination of equine reproduction strategies combined with practical techniques leading to synthesis and evaluation of breeding decisions. Anatomy and physiology of the mare and stallion, estrus detection and manipulation, artificial insemination, semen handling and processing, parturition and early care of neonates will be covered. Other topics will include selection of breeding stock and mating decisions.
Prerequisite(s): ALS 2304
Instructional Contact Hours: (2 Lec, 4 Lab, 4 Crd)

APSC 4344 - Mammalian Embryology (3 credits)
Embryology and fetal development in mammals, including cattle, pigs, rodents, and humans. Molecular and cellular processes that control embryology. Embryological processes that relate to pregnancy success and offspring survival and health. Fertility regulation. Assisted reproductive technologies. Gametogenesis, fertilization, embryo cleavage, placental development and function, blastulation, gastrulation, neurulation. Skeletal muscle, cardiac muscle, cartilage, urogenital, reproductive, respiratory, and digestive tissue development. Stem cell biology.
Prerequisite(s): ALS 2304
Instructional Contact Hours: (3 Lec, 3 Crd)

APSC 4404 - Commercial Poultry Enterprise Management (4 credits)
Production, management, and reproduction of meat- and egg-type chickens and turkeys. Emphasis is on the application of basic poultry science principles as they relate to commercial poultry enterprises. Advanced topics of economic analysis, program management, and problem solving used in decision making processes in integrated poultry operations.
Prerequisite(s): APSC 2104 and ALS 3104 and ALS 3204 and ALS 3304
Instructional Contact Hours: (3 Lec, 3 Lab, 4 Crd)

APSC 4414 - Beef and Sheep Production and Industry (4 credits)
Study of the commercial and purebred beef cattle and sheep industries. Principles and applications for successful and profitable beef and sheep production.
Prerequisite(s): APSC 2114 and ALS 3104 and ALS 3204 and ALS 3304
Instructional Contact Hours: (3 Lec, 3 Lab, 4 Crd)

APSC 4424 - Horse Production and Management (4 credits)
Reproduction, genetics, nutrition, herd health, planning and economics of private and commercial horse farms, and current issues in the horse industry.
Prerequisite(s): APSC 2124 and APSC 2424 and ALS 3104 and ALS 3204 and ALS 3304
Instructional Contact Hours: (3 Lec, 3 Lab, 4 Crd)

APSC 4444 - Swine Production (3 credits)
Principles for commercial and seedstock swine production; current management practices, housing and marketing; issues and challenges in the swine industry. Experience in husbandry, research, and other management techniques obtained during laboratory.
Prerequisite(s): APSC 2114 and ALS 3104 and ALS 3204 and ALS 3304
Instructional Contact Hours: (2 Lec, 3 Lab, 3 Crd)

APSC 4464 - Companion and Laboratory Animal Health and Management (4 credits)
Animal health, management, well-being, and government regulation in the maintenance, use and enjoyment of companion and laboratory animals.
Prerequisite(s): APSC 2164 and APSC 3064 and ALS 3104 and ALS 3204 and ALS 3304
Instructional Contact Hours: (3 Lec, 2 Lab, 4 Crd)

APSC 4514 - Animal Growth and Development (3 credits)
Meat animal growth and development processes, micro and gross anatomy, stem cell biology and growth, body and carcass composition with application to animal and carcass evaluation.
Prerequisite(s): ALS 2304 and ALS 3204
Instructional Contact Hours: (3 Lec, 3 Crd)

APSC 4554 - Advanced Livestock Enterprise Management (3 credits)
Application of principles needed to manage profitable and sustainable beef cattle, sheep, and swine enterprises. Use of techniques to develop and evaluate strategies resulting in sound livestock enterprise management decisions. Focus on advanced animal management protocols, enterprise analysis, resource allocation, marketing options and risk management.
Prerequisite(s): APSC 4414 or APSC 4444
Instructional Contact Hours: (2 Lec, 2 Lab, 3 Crd)

APSC 4624 - Topics in Equine Science (2 credits)
Review and critique of scientific literature related to equine science. Focus on creative and critical thinking. Principles and practice of information analysis, synthesis and evaluation through discourse and technical writing. Practical application of research and communication skills.
Prerequisite(s): ALS 2304
Instructional Contact Hours: (2 Lec, 2 Crd)

APSC 4774 - Nutrition and the Animal Brain (3 credits)
Relationship of diet and nutrients to animal behavior and neurobiology. Nervous system control of feeding behavior and metabolism to regulate whole body energy homeostasis in companion, livestock, and poultry species. Interactions of dietary formulations and nutrients affecting brain physiology and pathology.
Prerequisite(s): ALS 2304
Instructional Contact Hours: (3 Lec, 3 Crd)

APSC 4954 - Capstone Experience in Animal and Poultry Sciences (1-19 credits)
Student-defined learning experience that utilizes knowledge and skills already learned to acquire new skills, synthesize information and solve problems in the animal sciences. Requires approval from the department before commencement of the experience, and a final report at its conclusion. Open to APSC majors only. Completion of 75 credits towards the APSC degree required.
Prerequisite(s): APSC 2004
Instructional Contact Hours: Variable credit course

APSC 4964 - Field Study (1-19 credits)
Instructional Contact Hours: Variable credit course

APSC 4974 - Independent Study (1-19 credits)
Instructional Contact Hours: Variable credit course

APSC 4974H - Independent Study (1-19 credits)
Instructional Contact Hours: Variable credit course

APSC 4984 - Special Study (1-19 credits)
Instructional Contact Hours: Variable credit course

APSC 4994 - Undergraduate Research (1-19 credits)
Instructional Contact Hours: Variable credit course

APSC 4994H - Undergraduate Research (1-19 credits)
Instructional Contact Hours: Variable credit course

Undergraduate Course Descriptions (DASC)

DASC 1464 - Dairy Cattle Handling (1 credit)
Safety in dairy cattle handling; animal behavior; care, housing, and managerial practices related to dairy cattle. Experiential activities. Herding, sorting, halter training, health scoring, and milking.
Instructional Contact Hours: (3 Lab, 1 Crd)

DASC 1574 - Dairy Science First Year Experience (1 credit)
The scope of the dairy science undergraduate program, preparation for careers in dairy and related industries. Hands-on experience working with dairy cattle. Inquiry, problem solving, and integration of ideas and experiences with a focus on the dairy industry.
Instructional Contact Hours: (1 Lec, 1 Crd)

DASC 2204 - Entrepreneurship in Animal Agriculture (3 credits)
Impact of animal entrepreneurship on the US agricultural economy. Innovative products and services for the dairy and livestock industries. Strategic planning, human resources, production scheduling, marketing, and financial management for animal enterprises. Capital acquisition. Sensitivity analysis for key planning assumptions. Contingency planning and risk management. Identification of non-traditional career paths in the animal industry. Pre: Sophomore Standing.
Prerequisite(s): AAEC 1005
Instructional Contact Hours: (3 Lec, 3 Crd)

DASC 2474 - Dairy Science and Industry (3 credits)
Sustainable production, processing, and marketing of milk and milk products domestically and globally. Biology of dairy cattle with emphasis on genetics, reproduction, lactation, and nutrition. Management of dairy herds.
Instructional Contact Hours: (3 Lec, 3 Crd)

DASC 2484 - Dairy Cattle Evaluation (2 credits)
Critical appraisal of dairy cattle conformation and experience in linear trait scoring, linear trait relationships to profitability, competitive judging; written and oral justification; organization and conduct of shows and contests; showmanship. II.
Instructional Contact Hours: (6 Lab, 2 Crd)

DASC 2664 - Professional Discourse and Career Development (1 credit)
Emphasis on writing and speaking skills for livestock industry or post-baccalaureate education. Self-marketing, job acquisition, press relations, and conduct of meetings and labor management techniques.
Instructional Contact Hours: (1 Lec, 1 Crd)

DASC 2964 - Field Study (1-19 credits)
Instructional Contact Hours: Variable credit course

DASC 2974 - Independent Study (1-19 credits)
Instructional Contact Hours: Variable credit course

DASC 2984 - Special Study (1-19 credits)
Instructional Contact Hours: Variable credit course

DASC 3134 - Animal Agriculture and the Environment (3 credits)
Environmental issues associated with animal agriculture. Nutrient contamination of water resources, odor emission from livestock farms, environmental regulations affecting animal agriculture, and management practices to reduce the impacts of livestock farms on air and water quality.
Instructional Contact Hours: (3 Lec, 3 Crd)
Course Crosslist: APSC 3134

DASC 3274 - Applied Dairy Cattle Nutrition (3 credits)
Application of basic principles of nutrition in developing rations for dairy herds. Emphasis is placed on appropriate use of forages, ration formulation techniques, development of profitable rations, and ration delivery.
Corequisite(s): ALS 3204
Instructional Contact Hours: (3 Lec, 3 Crd)

DASC 3474 - Dairy Information Systems (3 credits)
Development, function, and use of dairy information systems including computerized performance testing programs for dairy cattle improvement and dairy herd management. Dairy management software applications. Precision dairy farming. Whole herd evaluation. Pre: Junior standing.
Prerequisite(s): DASC 2474
Instructional Contact Hours: (2 Lec, 3 Lab, 3 Crd)

DASC 3984 - Special Study (1-19 credits)
Instructional Contact Hours: Variable credit course

DASC 4174 - Applied Dairy Cattle Genetics (3 credits)
Application of genetic principles to dairy cattle improvement. Setting goals for genetic improvement, characteristics of traits included in selection, current methods of estimating breeding values, the role of artificial insemination and breed associations in genetic improvement, cattle genetics.
Prerequisite(s): ALS 3104
Instructional Contact Hours: (3 Lec, 3 Crd)

DASC 4274 - Dairy Ration Formulation (1 credit)
Develop entry level professional animal nutritionist skills; use customer and feed databases, use optimization algorithms to formulate least cost diets and feed mixes, simultaneous consideration of diet cost, animal product return, and environmental constraints; further develop intergrative thinking and problem solving skills.
Corequisite(s): DASC 3274
Instructional Contact Hours: (0 Lec, 3 Lab, 1 Crd)

DASC 4304 - Principles and Practices of Bovine Reproduction (2 credits)
Principles and techniques in reproductive physiology and herd management related to health, record keeping, estrus detection and synchronization, uterus and ovary condition. Ovarian function and superovulation, semen handling, artificial insemination and pregnancy detection are also considered.
Prerequisite(s): ALS 2304
Instructional Contact Hours: (1 Lec, 3 Lab, 2 Crd)
Course Crosslist: APSC 4304

DASC 4374 - Physiology of Lactation (3 credits)
Anatomy of the mammary gland and physiology of lactation in domestic and laboratory mammals with emphasis on dairy cattle. Mammary gland health and factors affecting lactation. Principles and techniques in dairy herd milking management.
Prerequisite(s): ALS 2304
Instructional Contact Hours: (2 Lec, 3 Lab, 3 Crd)

DASC 4384 - Mammary Immunology (3 credits)
This course is designed to provide students with basic knowledge of immunology as related to diseases of the mammary gland. Concepts of mammary gland immunity, disease etiology, immunopathology, diagnosis and therapy will be covered with a focus on ungulate species. Host pathogen interactions, solving problems, writing intensive, literature search.
Prerequisite(s): ALS 2304 and ENGL 1106
Instructional Contact Hours: (3 Lec, 3 Crd)

DASC 4474 - Advanced Dairy Management Evaluation (2 credits)
Students will learn to critically evaluate all aspects of dairy farm management on working farms. The assessment and recommendations will be developed using information gathered from herd production records and financial statements, visual observations at the farm, and an interview of the farm owner and workers. Data assessed will include milk, growth, health, reproduction, and culling records; cash flow and profit loss statements; nutrition and nutrient management records; and labor management structure. The assessments and reports will further develop integrative thinking, oral communication, and written communication skills.
Prerequisite(s): DASC 3474 and ALS 3204 and ALS 3304
Corequisite(s): DASC 4475
Instructional Contact Hours: (6 Lec, 0 Lab, 2 Crd)

DASC 4475 - Dairy Enterprise Management (3 credits)
Decision strategies for modern dairy businesses. 4475: Emphasis on relationships of enterprises and techniques for evaluation of business alternatives, efficiency of production, and profit. Use of microcomputer software to support management decisions. 4476: Concentration on herd replacements, personnel, facilities and issues of management associated with rapidly changing national and international markets, environmental regulations, and computer applications. Group projects and hands-on management of university dairy herd.
Prerequisite(s): DASC 2474
Instructional Contact Hours: (3 Lec, 3 Crd)

DASC 4476 - Dairy Enterprise Management (3 credits)
Decision strategies for modern dairy businesses. 4475: Emphasis on relationships of enterprises and techniques for evaluation of business alternatives, efficiency of production, and profit. Use of microcomputer software to support management decision. 4476: Concentration on herd replacements, personnel, facilities and issues of management associated with rapidly changing national and international markets, environmental regulations, and computer applications. Group projects and hands-on management of university dairy herd. Pre-requisite may be waived with permission of instructor.
Prerequisite(s): (DASC 4475 or AAEC 3454) and DASC 3474
Instructional Contact Hours: (2 Lec, 3 Lab, 3 Crd)

DASC 4664 - Translating Dairy Science (1 credit)
Analysis and interpretation of peer-reviewed literature in dairy science. Focus on dairy industry issues discussed in social media. Critical reasoning, information synthesis, and oral and written discourse. Paper presentations and discussion. Pre: Senior Standing
Prerequisite(s): DASC 2664
Instructional Contact Hours: (1 Lec, 1 Crd)

DASC 4964 - Field Study (1-19 credits)
Instructional Contact Hours: Variable credit course

DASC 4974 - Independent Study (1-19 credits)
Instructional Contact Hours: Variable credit course

DASC 4984 - Special Study (1-19 credits)
Instructional Contact Hours: Variable credit course

DASC 4994 - Undergraduate Research (1-19 credits)
Instructional Contact Hours: Variable credit course