ANIMAL SCIENCES (ANSC)

ANSC Class Schedule (https://courses.illinois.edu/schedule/DEFAULT/DEFAULT/ANSC)

Courses

ANSC 100  Intro to Animal Sciences  credit: 4 Hours.
Survey of beef and dairy cattle, companion animals, horses, poultry, sheep, and swine. Includes the importance of product technology and the basic principles of nutrition, genetics, physiology, and behavior as they apply to breeding, selection, feeding, and management. Lecture and lab.

ANSC 101  Contemporary Animal Issues  credit: 3 Hours.
Provides an understanding of fundamental issues impacting the care and use of animals, and their role in human welfare. Topics addressed include the fundamental principles of animal domestication and its impact on humans, animal welfare and care, animal-environmental interactions, food safety, diet and health issues, economic and societal issues facing the world today, and bioethical issues.

ANSC 103  Working With Farm Animals  credit: 2 Hours.
Introductory course that will provide novice students with the fundamentals of animal-animal and animal-human interactions for domestic farm animals. Emphasizes hands-on experiences to develop a background in the concepts and practice of recognizing and understanding the animal's physiology and behavior, animal well being, and animal responses to human interactions. Prerequisite: ANSC 100.

ANSC 105  Introductory Animal Science  credit: 3 Hours.
Provides an introductory background in the fundamental principles of animal domestication and its impact on humans, animal welfare and care, animal-environmental interactions, food safety, diet and health issues, economic and societal issues facing the world today, and bioethical issues.

ANSC 110  Life With Animals and Biotech  credit: 3 Hours.
Lecture/discussion course that will provide students an overview of biotechnology and animals. Focuses on biotechnological achievements involving animals and how they influence the global development of agriculture, medicine, and industry. Topics will be covered from scientific, discovery, historical, social, and political perspectives. This course satisfies the General Education Criteria for: Nat Sci Tech - Life Sciences

ANSC 199  Undergraduate Open Seminar  credit: 1 to 5 Hours.
An experimental course on a special topic in animal sciences. Topic may not be repeated except in accordance with the Code. May be repeated to a maximum of 12 hours. No more than 12 hours may be counted toward graduation.

ANSC 201  Principles of Dairy Production  credit: 3 Hours.
Surveys the dairy industry; examines principles of breeding, selection, reproduction, feeding, milking and management of dairy cattle. Prerequisite: ANSC 100.

ANSC 204  Intro Dairy Cattle Evaluation  credit: 2 Hours.
Evaluation of physical traits of dairy cattle in relation to economic value and genetic improvement; sire selection, mating systems, and genetic merit for dairy cattle. Field trip required. Prerequisite: ANSC 100 or consent of instructor.

ANSC 205  World Animal Resources  credit: 3 Hours.
Examination of the world's animals, domesticated and wild, and their uses in various climatic, economic and cultural contexts. Exploration of their contemporary management and their future prospects. Provides background for international experiences, such as ACES 298 and ACES 299. Prerequisite: Completion of the campus Composition I general education requirement. This course satisfies the General Education Criteria for: Advanced Composition

ANSC 206  Horse Management  credit: 3 Hours.
Focus on the principles of managing horses from birth through breeding; topics include reproductive physiology, breeding management, nutrition, diseases, parasites, herd health programs, genetics, facility design and exercise physiology.

ANSC 207  Companion Animal Biology & Care  credit: 3 Hours.
An introduction to companion animal biology through consideration of the physical structure, nutrition, behavior, and reproduction of animal species most commonly kept as companions. The basic information is applied to discussion of basic preventive health care. Course content is largely focused on cats and dogs, although other mammals, birds and reptiles will be briefly considered. Legal and economic issues, and ethical considerations associated with companion animals are also incorporated into the course discussion.

This course satisfies the General Education Criteria for: Nat Sci Tech - Life Sciences

ANSC 211  Breeding Animal Evaluation  credit: 3 Hours.
Application of current scientific tools, methods, and performance programs available to livestock breeders for improving beef cattle, swine, and sheep; emphasis on the changing nature of modern breeds of livestock as influenced by selection, economics, and consumer and market trends. Course requires visits (including weekends) to farms, related companies, and events to observe the latest techniques and scientific principles associated with livestock selection and evaluation. Students are responsible for personal expenses on the field trips. Prerequisite: Junior standing.

ANSC 219  Meat Technology  credit: 3 Hours.
Student participation in the transformation of live animals through harvest and carcass fabrication into food products for human consumption; includes laboratory. Purchase of personal equipment is required.

ANSC 221  Cells, Metabolism and Genetics  credit: 3 Hours.
Provides an introductory background in basic aspects of cell biology, physiology, and genetics. Topics addressed include cell structure, cell organelles, and different types of cells, protein synthesis and gene expression, chromosome structure, basic mechanisms of chromosome replication, basic principles of quantitative and population genetics, and an introduction to genomics and proteomics. Prerequisite: ANSC 100, CHEM 102 and 103 or concurrent enrollment.

ANSC 222  Anatomy and Physiology  credit: 3 Hours.
Provides an introductory background in basic and fundamental principles of animal anatomy and physiology. The major organ systems (muscle, skeletal, neural, endocrine, cardiovascular, respiratory, and renal) will be presented with an emphasis on comparative anatomy, integrated function, and specific homeostatic mechanisms. Prerequisite: ANSC 100.

ANSC 223  Animal Nutrition  credit: 3 Hours.
Provides an introductory background in the fundamental principles of animal nutrition and how nutrition impacts animal well-being and performance. Students will develop comprehensive knowledge in gastrointestinal and digestive anatomy and physiology, nutrient function and requirements, and energy utilization in various species. Specific topics include different classes and properties of nutrients, differences in digestive mechanisms in monogastri vs. ruminant animals, and how carbohydrates, lipids, proteins, minerals, and vitamins contribute to the nutrient requirements of animals. Prerequisite: ANSC 100, ANSC 221, and CHEM 104 and CHEM 105.

Information listed in this catalog is current as of 04/2018
ANSC 224 Animal Reproduction and Growth credit: 4 Hours.
Study of the basic principles of reproduction, lactation, growth, and
and hormonal regulation in animals as well as humans, including cell growth
and differentiation, processes of reproduction, biotechnological methods
of reproductive control, manipulation, performance enhancement of
lactation and growth. Prerequisite: ANSC 100, ANSC 221.

ANSC 250 Companion Animals in Society credit: 3 Hours.
Explores the current and historical functions and influences of
companion animals in American society. Topics include the evolution
of animal protection, the use of assistance and service animals, and
the growth of the pet supply industry. Controversial issues which are of
current concern to society will also be examined. This course satisfies the General Education Criteria for:
Cultural Studies - Western

ANSC 251 Epidemics and Infectious Diseases credit: 3 Hours.
Introduces students to the major past and present causes of plague
in humans as well as agricultural and companion animals. Smallpox,
yellow fever, bubonic plague, polio, SARS, AIDS, West Nile encephalitis,
Zika, PRRS, PEDV, foot and mouth disease, bovine spongiform
encephalopathy, and others will be discussed. The characteristics of
each disease, including, mode of transmission, symptoms, duration of
illness, and mortality rates will be presented. History and probability
of recurrence will also be explored. Prerequisite: Some knowledge in
anatomy and physiology may be helpful.

ANSC 256 Horse's Role in Human History credit: 3 Hours.
Provides an understanding of the crucial roles that horses have played
in the development and expansion of human civilization, including how
the role of the horse in culture and society has changed throughout
history. Topics addressed include an understanding of the evolution and
domestication of horses, use of horses for transportation, sport, warfare
and power, and the impact of horses on societal issues facing the world
today.

ANSC 293 Internship Off Campus credit: 1 to 4 Hours.
Supervised, off-campus learning experience in an animal-related
enterprise. May be repeated in the same or separate terms to a maximum
of 10 hours. Prerequisite: Good academic standing; ANSC 100.

ANSC 294 Intern On Campus Practical Exp credit: 1 to 5 Hours.
Supervised, on-campus learning experience associated with subject
matter specific to animal sciences. Approved for both letter and S/U
grading. May be repeated in the same or separate terms to a maximum
of 10 hours. Prerequisite: Good academic standing; ANSC 100.

ANSC 295 UG Research or Thesis credit: 1 to 5 Hours.
Individual research in animal sciences. May be repeated in the same or
separate terms to a maximum of 10 hours. Prerequisite: Minimum GPA of
2.5; not open to students on probation; consent of instructor.

ANSC 298 Undergraduate Seminar credit: 1 Hour.
Presentations and discussion of employment opportunities, departmental
research activities, and topics relevant to animal agriculture. Prerequisite: Sophomore standing.

ANSC 299 Animal Mgt Field Studies credit: 1 or 2 Hours.
Field studies of farms and service industries; discusses and
demonstrates management practices on commercial farms. Trip
normally taken during spring break. May be repeated up to 8 hours in
separate terms if topics vary.

ANSC 301 Food Animal Production, Management, and Evaluation
credit: 3 Hours.
Provides an overview of how nutrition, genetics, and environment affect
beef cattle, swine, and sheep growth, development, and end-product
quality and value. Students get hands-on experience evaluating and
determining value of live animals and carcasses. Prerequisite: Credit
or concurrent enrollment in ANSC 223 and ANSC 224; or consent of
instructor.

ANSC 305 Human Animal Interactions credit: 3 Hours.
Explores the relationships between humans and companion animals and
the roles and functions that animals play in today's society. Examines
the evolution of the human/companion animal bond, benefits and
disadvantages of this bond, and working/nonworking roles of companion
animals. Controversial issues which are of current concern to society will
be examined in detail. Writing and in-class discussions are emphasized.
Prerequisite: ANSC 250.

ANSC 306 Equine Science credit: 3 Hours.
Understand and apply current scientific research and principles of equine
science to intensive horse production. An in-depth approach to equine
reproductive physiology, nutrition, anatomy and exercise physiology will
be followed using a combined lecture and laboratory format. Emphasis
on current research and hands-on techniques. Prerequisite: ANSC 206,
ANSC 222 or equivalent, and credit or concurrent enrollment in ANSC 224
or equivalent; or consent of instructor.

ANSC 307 Companion Animal Management credit: 3 Hours.
This course provides an advanced overview of companion animal biology
through consideration of the physical structure, nutrition, behavior, and
reproduction of animal species most commonly kept as companions.
Course content is applied to discussion of best management practices
and basic preventive health care. Course content is largely focused
on cats and dogs, although other mammals, birds and reptiles are
briefly considered. Legal and economic issues, ethical considerations,
and career opportunities associated with companion animals are
also incorporated into course discussion. Credit is not given for both
ANSC 307 and ANSC 207.

ANSC 309 Meat Production and Marketing credit: 2 Hours.
General approach to meat utilization with emphasis on selecting, grading,
cutting, and pricing meat for the retail, restaurant, and food service
industry. This course includes laboratory and may use field trips to
establishments to highlight course concepts.

ANSC 310 Meat Selection and Grading credit: 3 Hours.
Study characteristics associated with the value of carcasses, primal
and retail cuts from meat animals; emphasize USDA grading and
specifications as well as written communication. Field trips to meat
packing plants are required.

ANSC 312 Advanced Livestock Evaluation credit: 3 Hours.
Advanced instruction in the selection of breeding animals of beef, sheep,
and swine species and in the evaluation of market animals for slaughter.
This course requires visits to farms, related companies, and events to
observe the latest techniques and scientific principles associated with
livestock selection and evaluation. Prerequisite: ANSC 211 or consent of
instructor.

ANSC 313 Horse Appraisal credit: 2 Hours.
Advanced course for students interested in improving their performance
and conformation evaluation skills; provides exposure to the horse show
industry and the career opportunities associated with this facet of the
horse industry; students may compete in intercollegiate judging contests.
ANSC 314  Adv Dairy Cattle Evaluation  credit: 2 Hours.
Advanced instruction in the selection of breeding dairy animals. Involves visits to farms, related companies and events to observe the latest techniques and scientific principles associated with dairy cattle selection and evaluation. Field trips for cattle judging are required. May be repeated to a maximum of 4 hours. Prerequisite: ANSC 204 or consent of instructor.

ANSC 322  Livestock Feeds and Feeding  credit: 3 Hours.
Livestock feeds and practical feeding applications for livestock will be addressed. Feed identification and ration formulation will be strongly emphasized. One session of this class will take place at the UIUC Feed Mill. Prerequisite: ANSC 223.

ANSC 331  Biology of Reproduction  credit: 2 to 4 Hours.
Study of comparative reproduction, lactation, behavior, reproductive strategies, assisted reproduction, and reproductive diseases in domestic and wild animals including mammals, birds, reptiles, and amphibians. Prerequisite: Sophomore standing; IB 104 or one introductory level biology course.

ANSC 350  Cellular Metabolism in Animals  credit: 3 Hours.
Principles and regulation of cellular metabolism in animals, emphasizing energy derivation and its relationship to domestic animal and food production. Prerequisite: CHEM 104, CHEM 105, and ANSC 221 or equivalent.

ANSC 363  Behavior of Domestic Animals  credit: 4 Hours.
Introduction to concepts of animal behavior with emphasis on domestic animals; lecture and lab. Prerequisite: ANSC 100.

ANSC 366  Animal Behavior  credit: 3 Hours.
Same as ANTH 342 and IB 329. See IB 329.

ANSC 370  Companion Animal Policy  credit: 3 Hours.
This course provides an overview of public policy with respect to the use and treatment of companion animals in the United States. Current and alternative policies are considered in terms of their effectiveness in improving or otherwise altering the treatment of companion animals. The influences of animal protection organizations, consumer groups, politicians, the scientific community, and other stakeholders on the development and enforcement of policies are examined in detail. Prerequisite: ANSC 250.

ANSC 396  UG Honors Research or Thesis  credit: 1 to 5 Hours.
Independent study, under the supervision of a faculty member, on a problem of appropriate scope and character that culminates in writing a thesis. Intended primarily for honors students who plan on conducting research or pursuing graduate study. Thesis projects must be supervised by a faculty member and reviewed by a departmental committee. Students must present a satisfactory thesis to receive credit. May be repeated in the same or subsequent terms to a maximum of ten hours. Prerequisite: Junior standing, minimum GPA of 3.4, consent of a faculty member.

ANSC 398  UG Experiential Learning  credit: 1 to 5 Hours.
Student-directed experiential learning on special topics directly pertaining to subject matter in animal sciences. Students are required to complete a Memorandum of Agreement prior to enrolling in this course. Additional fees may apply. See Class Schedule. Approved for Letter and S/U grading. May be repeated up to 5 hours per semester, up to a maximum of 10 total hours.

ANSC 400  Dairy Herd Management  credit: 3 Hours.
The technology of modern milk production practices; application of principles in nutrition, physiology, economics, health and hygiene, waste management, and facilities design for efficient dairy herd management systems. 3 undergraduate hours. 3 graduate hours. Prerequisite: ANSC 201 or consent of instructor.

ANSC 401  Beef Production  credit: 3 Hours.
The principles of the management of beef cattle enterprises. Applies science and technology to the breeding, selection, feeding, health and production of beef and beef products. Emphasizes the use of research findings in decision-making. 3 undergraduate hours. 3 graduate hours. Credit is not given for both ANSC 401 and ANSC 213. Prerequisite: ANSC 223 or equivalent.

ANSC 402  Sheep Production  credit: 3 Hours.
Study of management, nutrition, reproduction, genetics, marketing, economics, housing, health and production record programs as they apply to sheep production. History of the U. S. sheep industry will be explored along with a study of wool production, marketing and processing. 3 undergraduate hours. 3 graduate hours. Prerequisite: ANSC 223 or equivalent.

ANSC 403  Pork Production  credit: 3 Hours.
Applies science and technology to the selection, breeding, feeding, housing and management of swine in a production enterprise; emphasizes use of research findings in decision making. 3 undergraduate hours. 3 graduate hours. Credit is not given for both ANSC 403 and ANSC 213. Prerequisite: ANSC 221 or equivalent; ANSC 223 or equivalent; ANSC 467; and ANSC 224 or equivalent or ANSC 431.

ANSC 404  Poultry Science  credit: 3 Hours.
Basic principles of genetics, physiology, nutrition, and health of avian species; the application of science and technology in solving the breeding, nutrition, disease, housing, and other management problems encountered in commercial egg and poultry meat production. 3 undergraduate hours. 3 graduate hours.

ANSC 405  Advanced Dairy Management  credit: 2 Hours.
Advanced dairy management compliments the four other classes offered in the dairy certificate program featuring applied management principles and practices needed in modern dairy production. 2 undergraduate hours. 2 graduate hours. Prerequisite: ANSC 201 or equivalent or consent of instructor.

ANSC 406  Zoo Animal Conservation Sci  credit: 3 Hours.
Topics related to the conservation, physiology and management of exotic animal species in a captive setting will be addressed. These include conservation biology, population genetics, nutrition, reproduction (natural and assisted), behavior, exhibitry, environmental enrichment and veterinary care. Also covers taxonomy, zoo research, the role of zoos in conservations, and the ethics of maintaining captive animals. 3 undergraduate hours. 3 graduate hours. One Saturday field trip may be required. Prerequisite: ANSC 221 or IB 104, or equivalent.

ANSC 407  Animal Shelter Management  credit: 3 Hours.
Basic management concepts related to maintaining the physical and behavioral health of companion animals in a shelter setting will be addressed. Population dynamics and management will be heavily emphasized. Utilizes practical resources available through local and national animal welfare organizations. Two class sessions will take place at the Champaign County Humane Society. One Saturday field trip is required. 3 undergraduate hours. 3 graduate hours. Prerequisite: ANSC 207 or ANSC 307.
ANSC 409  Meat Science  credit: 3 Hours.
Fundamental biological principles that influence composition, processing, preservation, and quality of meat and meat products. 3 undergraduate hours. 3 graduate hours. Prerequisite: ANSC 221 or equivalent, ANSC 222 or equivalent, ANSC 223 or equivalent, and ANSC 224 or equivalent.

ANSC 420  Ruminant Nutrition  credit: 3 Hours.
Physiology and microbiology of digestion in the ruminant, and biochemical pathways of utilization of the absorbed nutrients for productive purposes. 3 undergraduate hours. 3 graduate hours. Prerequisite: ANSC 223 or equivalent.

ANSC 421  Minerals and Vitamins  credit: 3 Hours.
Nutritional implications and metabolic roles of minerals and vitamins in animal metabolism. The course is designed to instill a basic understanding of vitamin and mineral functions, absorption, metabolism, and excretion. Research methodologies used in the study of vitamin and mineral nutrition will also be discussed. 3 undergraduate hours. 3 graduate hours. Prerequisite: ANSC 223 or equivalent, credit or concurrent registration in MCB 450 or ANSC 350, or consent of instructor.

ANSC 422  Companion Animal Nutrition  credit: 3 Hours.
Digestive physiology and basic nutritional considerations of companion animals, with primary focus on dogs and cats. Topics discussed include nutritional idiosyncrasies of dogs and cats, the importance of nutrition in various physiological states, and nutrient needs during disease. Information on pet food regulations, common ingredients and formulation, manufacturing methods, and trends in the pet food industry will also be covered. 3 undergraduate hours. 3 graduate hours. Prerequisite: ANSC 223 or equivalent.

ANSC 423  Advanced Dairy Nutrition  credit: 2 Hours.
All aspects of dairy cattle nutrition will be discussed including nutrients, phase feeding (milk curve analysis, dry matter intake, and body weight loss), dry and transition cow programs, forage feeding systems, feed delivery approaches, metabolic disorders related to nutrition, and application of various dairy feeding guides. 2 undergraduate hours. 2 graduate hours. Prerequisites: ANSC 201 or equivalent, or consent of instructor.

ANSC 424  Pet Food & Feed Manufacturing  credit: 3 Hours.
Integrates principles of animal nutrition with various aspects pertaining to pet food and animal feed manufacturing. Topics discussed in this course include processing technologies (e.g., extrusion, retorting, baking) involved in the manufacturing of pet foods and animal feeds, principles of diet formulation and nutritional guidelines, and an overview of regulatory affairs, quality control, and good manufacturing practices. This course includes two field trips to a pet food manufacturing facility and a food and feed ingredient company. 3 undergraduate hours. 3 graduate hours. Prerequisite: Required - ANSC 223; Recommended - ANSC 322 and ANSC 422.

ANSC 431  Advanced Reproductive Biology  credit: 3 Hours.
Course is an upper-level undergraduate or entry-level graduate course dealing with reproductive biology. It will include the study of basic cell biology of reproduction, lactation, growth and hormone regulation of domestic and non-domestic animals as well as humans, including biotechnology methods of reproduction control, manipulation, performance enhancement of lactation and growth, and disease control. 3 undergraduate hours. 3 graduate hours. Prerequisite: ANSC 224 or equivalent.

ANSC 435  Milk Quality and Udder Health  credit: 2 Hours.
An advanced course on the physiological basis of mammary growth, milk secretion, and udder health. Topics covered includes mammary gland anatomy, hormonal control, causes and control of mastitis, milk harvesting, and milk quality. The course will be delivered via CD and web-based synchronous discussion. Students should have a basic course in dairy/animal sciences, or physiology, or consent of the instructor before taking this course. 2 undergraduate hours. 2 graduate hours. Prerequisite: ANSC 201 or equivalent or consent of instructor.

ANSC 437  Adv Reproductive Management  credit: 2 Hours.
The focus of this course is advanced techniques and technologies used to manage production livestock. The course will emphasize advanced and emerging technologies such as embryo transfer, cloning, semen sexing, and ultrasound pregnancy diagnosis and fetal sexing and innovations in existing procedures including artificial insemination, reproductive health management, and estrus synchronization. Implementation of existing and emerging techniques and technologies and research and discovery will be covered for individuals focusing on careers in livestock production, clinical veterinary medicine, education, technical service/support, and research and development. 2 undergraduate hours. 2 graduate hours. Prerequisite: ANSC 331 or equivalent, or consent of instructor.

ANSC 438  Lactation Biology  credit: 4 Hours.
Examines the structural and functional development of the mammary gland, cell biology, and control of milk synthesis, and composition and biochemistry of milk. Compares and analyzes the physiological processes of lactation in mammals. 4 undergraduate hours. 4 graduate hours. Prerequisite: ANSC 224 or equivalent.

ANSC 440  Applied Statistical Methods I  credit: 4 Hours.
Same as ABE 445 and CPSC 440, or equivalent. 4 undergraduate hours. Same as CPSC 440. 3 or 4 undergraduate hours. 3 or 4 graduate hours. Same as ANTH 441. See ANTH 441.

ANSC 441  Human Genetics  credit: 3 or 4 Hours.
Principles of heredity and their application to the problems of animal improvement. 3 undergraduate hours. 3 graduate hours.

ANSC 444  Applied Animal Genetics  credit: 3 Hours.
Design and analysis of experiments: multiple regression, method of fitting constants, factorial experiments with unequal subclass numbers, analysis of covariance, experimental design; computer applications to agricultural experiments using statistical packages. Same as ABE 445 and CPSC 444. 4 undergraduate hours. 4 graduate hours. Prerequisite: CPSC 440, or equivalent.

ANSC 446  Population Genetics  credit: 3 or 4 Hours.
Conceptual and mathematical approach to the genetics of populations: estimation of allele and genotype frequencies; Hardy-Weinberg principle; measures of genetic diversity and distance; selection; non-random mating; genetic drift; mutation; neutral theory; migration and population subdivision; linkage and recombination; coalescence and phylogeographic inference. Applications to animals, plants, human health and wildlife conservation. Same as IB 416. 3 or 4 undergraduate hours. 3 or 4 graduate hours. Students desiring 4 hours credit do additional work in some area of population genetics. Prerequisite: An introductory genetics course (ANSC 221 or IB 204); one of MATH 220, MATH 221, or MATH 234; or consent of instructor.

Information listed in this catalog is current as of 04/2018
ANSC 447  Advanced Genetics and Genomics  credit: 4 Hours.
Current principles and methods in genetics and genomics to better understand genome function, genome evolution, the genetic architecture of complex traits, the genetic basis of human and animal diseases, and animal productivity. To build a strong foundation for the application of novel genomic tools, the course will provide an overview of main concepts in genetics and genomics, including gene-environment interaction and epigenetic modifications. The focus of the course will be on mammals, but novel applications of the new sequencing technologies to other systems will be discussed. In addition to the presentation of scientific concepts and discoveries, the course will include a significant practical component. Students will learn software programs used for genetic mapping and bioinformatics analysis, will review and present scientific papers, and will write a research paper proposing their own experiments. 4 undergraduate hours. 4 graduate hours. Prerequisite: ANSC 221, MCB 150, or IB 150.

ANSC 448  Math Modeling in Life Sciences  credit: 3 or 4 Hours.
Introduction to deterministic and stochastic mathematical models for the life sciences, statistical methods for fitting and testing models, and computer simulation programs. Applications to populations, processes, and products of animals, plants, and humans. Same as IB 487 and STAT 458. 3 or 4 undergraduate hours. 3 or 4 graduate hours. Students desiring 4 hours credit do additional work in some area of mathematical modeling in the life sciences. Prerequisite: IB 104; a course in calculus, and a course in computer sciences; or consent of instructor.

ANSC 449  Biological Modeling  credit: 3 or 4 Hours.
Same as CPSC 448, GEOG 468, and IB 491. See GEOG 468.

ANSC 450  Comparative Immunobiology  credit: 4 Hours.
Advanced concepts of immunophysiology and immunogenetics. Immunophysiology with an emphasis on immune-neuroendocrine interactions. The molecular and cellular basis of self-nonself recognition with an emphasis on the major histocompatibility complex in vertebrates and innate immunity in both vertebrates and invertebrates. The mucosal immune system, which requires a complex interplay between innate and acquired immunity to protect mucosal surfaces exposed to the environment. A working knowledge of genetics and cellular and molecular biology is recommended. Same as MCB 442 and PATH 410. 4 undergraduate hours. 4 graduate hours.

ANSC 451  Microbes and the Anim Indust  credit: 3 Hours.
Fundamental aspects of the ecology of microorganisms and their biochemical activities related to the degradation of organic matter with emphasis on the gastrointestinal tract of production animals. 3 undergraduate hours. 3 graduate hours. Prerequisite: MCB 100, and ANSC 350, MCB 300, MCB 424, or equivalent.

ANSC 452  Animal Growth and Development  credit: 3 or 4 Hours.
Basic principles of animal growth from early fetal development through typical marketing ages for the major domestic animal species. Topics discussed include molecular and cellular determinants of tissue development and whole animal growth, with coverage of current and future technologies for manipulating growth to enhance animal production. 3 or 4 undergraduate hours. 4 graduate hours. Prerequisite: ANSC 221, ANSC 222, ANSC 223, and ANSC 224.

ANSC 453  Stem Cell Biology  credit: 3 or 4 Hours.
The history of stem cell biology as well as up-to-date topics in stem cell research will be presented and discussed with emphasis on experimental approaches. Each student is expected to present research articles relative to each focus area and lead the discussion for the whole class every week. Topics include Molecular Reproductive Biology, Genetics, Physiology of both adult- and embryo-derived stem cells, and their application to Biotechnology and Regenerative Medicine. 3 undergraduate hours. 4 graduate hours. Prerequisite: STAT 100 or equivalent, MCB 316, ANSC 221, ANSC 224, or equivalent; or consent of instructor.

ANSC 467  Applied Animal Ecology  credit: 3 Hours.
An in-depth multidisciplinary approach (physiology, behavior, immunology, neuroscience) to understanding animal-environment interactions (including thermal, air, microbial, photic and behavioral factors) as basis for prescribing practical environments for keeping animals. Courses in physiology, biology, nutrition, microbiology, and genetics are recommended. 3 undergraduate hours. 3 graduate hours. Prerequisite: ANSC 221 or equivalent, ANSC 222 or equivalent, and ANSC 223 or equivalent; or consent of instructor.

ANSC 471  ANSC Leaders & Entrepreneurs  credit: 3 Hours.
Designed to familiarize students with the tools and skills necessary for successful business operation in industry and entrepreneurial environments including food animal production farms. The overall aim is to explore how enhanced interpersonal and leadership skills facilitate positive relations in business. Students will design a business plan, an entrepreneurial enterprise, that will be read by an external committee of professors, community members, and business owners and evaluated for its viability and creativity. This course is relevant for leaders as well as future entrepreneurs interested in acquiring valuable skills that may be applied to many careers. 3 undergraduate hours. 3 graduate hours. Prerequisites: Any advanced composition course.

ANSC 498  Integrating Animal Sciences  credit: 2 Hours.
Introduction to the theoretical basis of and skills associated with leadership, inquiry, and collaborative learning. Capstone experience in integrating knowledge, practicing skills, and applying theory through collaborative projects that address current issues in animal sciences. Projects relate to the impact of animals and animal use on humans and societal issues facing the world today. 2 undergraduate hours. 2 graduate hours. Prerequisite: Must have completed one of the following: ANSC 293, ANSC 294, ANSC 295, ANSC 299, ANSC 396, ANSC 398, ACES 293, ACES 298 or ACES 299.

ANSC 499  Seminar  credit: 1 to 4 Hours.
Group discussion or an experimental course on a special topic in animal sciences. 1 to 4 undergraduate hours. 1 to 4 graduate hours. May be repeated.

ANSC 509  Muscle Biology  credit: 2 Hours.
Microstructure and chemical composition of muscle tissue; chemistry and biosynthesis of muscle and connective tissue proteins; and biochemical aspects of muscle contraction and rigor mortis. Prerequisite: ANSC 452, ANSC 409, and ANSC 350 or MCB 450.

ANSC 510  Science of Animal Well-Being  credit: 1.5 Hours.
Same as VCM 510. See VCM 510.

ANSC 520  Protein and Energy Nutrition  credit: 3 Hours.
Physiological aspects of protein and amino acids, fats and fatty acids, and carbohydrates as applied to higher animals; includes classification, digestion, absorption, utilization, metabolism, and dietary deficiencies and excesses. Same as NUTR 520. 3 graduate hours. No professional credit. Prerequisite: MCB 450 or equivalent and ANSC 222 or equivalent.
ANSC 521 Regulation of Metabolism credit: 4 Hours. 
Same as FSHN 511 and NUTR 511. See NUTR 511.

ANSC 522 Advanced Ruminant Nutrition credit: 3 Hours. 
Physiological and microbiological aspects of ruminant digestion and their influence on the metabolism of the extraruminal tissues; interpretation of nutritive requirements in terms of rumen microbial activities; and evaluation of research techniques. Offered in alternate years. Prerequisite: ANSC 420 or equivalent, and ANSC 350, MCB 450, or equivalent.

ANSC 523 Techniques in Animal Nutrition credit: 3 Hours. 
Discusses and applies methods of laboratory analysis and animal experimentation frequently used in nutrition research. Same as NUTR 523. 3 graduate hours. No professional credit. Prerequisite: Courses in nutrition, physiology, and biochemistry and consent of instructor.

ANSC 524 Nonruminant Nutrition Concepts credit: 2 Hours. 
Review of literature in nonruminant nutrition. Emphasizes basic concepts associated with food intake, carbohydrate and fat utilization, protein quality, bioavailability of nutrients, and diet formulation. Same as NUTR 524. 2 graduate hours. No professional credit. Prerequisite: Consent of instructor.

ANSC 525 Topics in Nutrition Research credit: 1 Hour. 
Same as FSHN 510 and NUTR 510. See NUTR 510.

ANSC 526 Adv Companion Animal Nutrition credit: 3 Hours. 
Students will learn how to effectively apply advanced concepts related to pet nutrition and disease, including the metabolism within healthy and diseased dogs and cats, how nutrition may aid in preventing and treating disease, and the science behind pet food formulation and production. Students will develop critical-thinking and problem-solving skills by writing and reviewing grant proposals and delivering an oral presentation. Prerequisite: ANSC 422 (Companion Animal Nutrition) or consent of instructor.

ANSC 530 Advanced Endocrinology credit: 2 Hours. 
Same as MCB 512 and CB 512. See MCB 512.

ANSC 533 Repro Physiology Lab Methods credit: 1 to 3 Hours. 
Laboratory methods used in reproductive physiology studies, such as blood sampling, large animal surgery, collection of tissues and gametes, embryo recovery, in vitro fertilization, tissue culture, hormone measurements, and directed individual research problems. Same as MCB 533 and CB 533. Prerequisite: Consent of instructor.

ANSC 541 Regression Analysis credit: 5 Hours. 
Same as CPSC 541. See CPSC 541.

ANSC 542 Applied Bioinformatics credit: 4 Hours. 
Introduction to theoretical and applied aspects of bioinformatics. Topics include genomic and proteomic databases, sequence alignment and search algorithms (e.g., BLAST, FASTA, CLUSTAL W), predictive methods in DNA sequence, machine-learning techniques (e.g., Hidden Markov Models) and data mining, biomolecular structure and its prediction, molecular evolution and phylogenetic reconstruction, structural genomics and phylogenomics. Concepts are complemented with hands-on experience with computational biology databases and bioinformatic tools. Same as CPSC 569 and IB 506. Prerequisite: Graduate level status or consent of instructor.

ANSC 543 Bioinformatics credit: 4 Hours. 
Same as CHBE 571, MCB 571, and STAT 530. See CHBE 571.

ANSC 545 Statistical Genomics credit: 3 or 4 Hours. 
This course presents current statistical approaches to analyze DNA microarray, quantitative trait loci and proteomic data and understand the genetic architecture of complex phenotypes including health, performance and behavior. DNA microarray studies measure the expression of thousands of genes simultaneously. Quantitative trait loci (QTL) mapping studies detect associations between genomic regions and phenotypes. Results from these and proteomic studies help identify and quantify genes, regulators and products leading to drug, biotechnology and scientific discoveries. Same as CPSC 545 and IB 507. Prerequisite: Graduate level course in Statistics and graduate level course in Molecular Biology.

ANSC 554 Immunobiological Methods credit: 3 Hours. 
Same as PATH 544. See PATH 544.

ANSC 561 Animal Stress Physiology credit: 2 Hours. 
Examines animal’s physiological and behavioral adaptations to stress. Prerequisite: Consent of the instructor.

ANSC 590 Animal Sciences Seminar credit: 0 to 2 Hours. 
Discussions of current research and literature. Registration for 0 to 2 hours each term is expected for animal sciences graduate students. Same as NUTR 521. 0 to 2 graduate hours. No professional credit. Approved for Letter and S/U grading. May be repeated in separate semesters to a maximum of 2 hours for Masters students and 4 hours for PhD students.

ANSC 592 Adv Topics in Animal Science credit: 1 to 4 Hours. 
Selected topics associated with teaching, research, and production related to the animal industry. Prerequisite: Consent of instructor.

ANSC 593 Res Studies in Animal Sciences credit: 1 to 4 Hours. 
Directed and supervised study of selected research topics in Animal Sciences. May be repeated to a maximum of 4 hours. Prerequisite: Consent of instructor.

ANSC 599 Thesis Research credit: 0 to 16 Hours. 
Approved for S/U grading only. May be repeated.