ANIMAL SCIENCE—ANS

Department of Animal Science
College of Agriculture
and Natural Resources

101 Professional Development in Animal Science I
Fall, Spring. 1(0-2) R: Open to students in the Animal Science major.
Careers in animal science. Job application, portfolio development, interviewing, and resume development.

110 Introductory Animal Agriculture
Fall, Spring. 4(3-2) SA: ANS 112
History of animal agriculture and its relationship to human needs, production systems, marketing, and environmental considerations. Current goals of and limitations affecting U.S. farm animal production.

122A Feedlot Clerkship
Fall. 2(0-4) R: Open to students in the Institute of Agricultural Technology. SA: ANS 024
Clerkship to gain hands-on skills in the management of a working feedlot. Feeding cattle, feed storage, manure management, health programs, evaluation and selection of cattle, facilities maintenance, marketing fed cattle.

122B Beef Cow Calf Clerkship
Spring. 2(0-4) R: Open to students in the Institute of Agricultural Technology. SA: ANS 023
Clerkship to gain hands-on skills in the management of a working cow-calf farm. Feeding, reproduction, genetics, and selection, facilities maintenance, exhibiting cattle for sale and daily management skills.

132 Dairy Farm Management Seminar
Fall. 1(1-0) R: Open to students in the Institute of Agricultural Technology. SA: ANS 014
Challenges and opportunities in the dairy industry.

140 Fundamentals of Horsemanship
Fall, Spring. 2(0-4) A student may earn a maximum of 4 credits in all enrollments for this course. R: Approval of department.
Safe horse handling skills. Riding skills. Riding aids and working with the horse at the beginner, intermediate or advanced level.

141 Draft Horse Basics
Fall, Spring. 2(0-4)
Safe handling, hitching and driving of draft horses. Care and maintenance of harness and horse drawn equipment.

142 Horse Training for Competition
Summer. 2(0-4) RB: ANS 140 R: Approval of department.
Training techniques to prepare horses for competition. Exhibiting horses.

145 Horse Behavior and Welfare
Fall. 1(1-0) R: Open to students in the Institute of Agricultural Technology. SA: ANS 061A

146 Fundamentals of Horse Training
Spring. 3(0-6) R: Open to students in the Institute of Agricultural Technology. SA: ANS 063a
Training and preparing an untrained horse for showing. Sale preparation.

147 Horse Management Placement Seminar
Spring. 1(1-0) R: Open to students in the Institute of Agricultural Technology. SA: ANS 064
Securing a placement training experience. Writing a resume.

148 Methods of Instructing Safe Horsemanship
Spring. 2(2-0) R: Open to students in the Institute of Agricultural Technology. SA: ANS 041
Lesson planning and communication skills for riding instructors. Safety and legal issues. Riding instructor certification. Organizations.

149 Horse Management Clerkship
Spring. 2(0-4) R: Open to students in the Institute of Agricultural Technology. SA: ANS 025
Management of a working horse farm. Feeding, reproduction, genetics, selection, facilities maintenance, and daily management skills.

171 Swine Clerkship
Fall. 2(0-4) R: Open to students in the Institute of Agricultural Technology. SA: ANS 024

200A Introductory Judging of Livestock or Carcasses
Spring. 1 to 2 credits. A student may earn a maximum of 3 credits in all enrollments for this course. A student may earn a maximum of 8 credits from ANS 200A, ANS 200C, ANS 200D, ANS 300A, ANS 300C and ANS 300D. P: ANS 211

200B Introductory Judging of Dairy Cattle
Spring. 1 to 2 credits. A student may earn a maximum of 3 credits in all enrollments for this course. A student may earn a maximum of 8 credits from the following courses: ANS 200A, ANS 200B, ANS 200C, ANS 200D, ANS 300A, ANS 300B, ANS 300C and ANS 300D. SA: ANS 200B

200D Introductory Judging of Horses
Spring. 1 to 2 credits. A student may earn a maximum of 3 credits in all enrollments for this course. A student may earn a maximum of 8 credits from ANS 200A, ANS 200B, ANS 200C, ANS 200D, ANS 300A, ANS 300B, ANS 300C and ANS 300D. SA: ANS 200B
230 Dairy Herd Management
Fall. 3(2-2) P: ANS 232 RB: ANS 132 and ANS 205 and ANS 215 R: Open to students in the Institute of Agricultural Technology. SA: ANS 032

232 Introductory Dairy Cattle Management
Fall. 3(2-2) Not open to students with credit in ANS 432.
Principles and techniques of dairy herd management including calf and heifer care plus lactating and dry cow management.

233 Dairy Feed Management
Fall. 3(2-2) RB: ANS 203 R: Open to students in the Institute of Agricultural Technology. SA: ANS 051

235 Dairy Herd Reproduction
Fall. 2(2-0) P: ANS 205 RB: ANS 232 or concurrently R: Open to students in the Institute of Agricultural Technology. Application of reproductive principles to dairy production.

238 Dairy Health Management
Spring. 3(2-2) P: ANS 232 or concurrently R: Open to students in the Institute of Agricultural Technology.
Detection of dairy cattle disease. Infections and metabolic problems.

240 Horse Farm Management
Fall. 3(2-2) RB: ANS 203 and ANS 205 and ANS 242 and ABM 130 R: Open to students in the Horse Management major. SA: ANS 066
Integration of principles and skills into a farm management system. Managerial qualities, goal setting, facilities management. Health programs.

242 Introductory Horse Management
Fall. 3(2-2) Not open to students with credit in ANS 442.
Principles of horse management. Reproduction, nutrition, herd health, genetics, economics, marketing. Field Trips required.

243 Horse Nutrition and Feeding
Fall. 3(2-2) P: ANS 203 R: Open to students in the Institute of Agricultural Technology. SA: ANS 078
Nutrient requirements of the horse, selection and evaluation of feedstuffs, balancing diets by hand and by computer, pasture management.

245 Horse Exercise Physiology
Fall. 2(2-0) RB: ANS 242 R: Open to students in the Institute of Agricultural Technology. SA: ANS 068
Horse body systems, physiology of exercise and conditioning programs. Goals of various conditioning programs. Common ailments of sport horses.

252 Introduction to Management of Avian Species
Fall of odd years. 3(2-2)
Management of commercial poultry flocks and avian flocks. Requirements, reproduction, breeding, housing and disease.
401 Ethical Issues in Animal Agriculture  
Spring. 1(0-2) RB: ANS 313 or ANS 314 or ANS 315 R: Open to juniors or seniors.  
Ethical issues related to local, national, and international animal agriculture.

404 Advanced Animal Genetics  
Spring of odd years. 2(1-2) P: (ANS 314 or concurrently) or ZOL 341  
Application of molecular genetics and genome technologies to animal breeding. Genome maps for agricultural, aquacultural, and companion animal species. Incorporation of genotype data into selection programs.

405 Endocrinology of Reproduction  
Fall. 4(3-2) P: ANS 315 R: Not open to freshmen or sophomores.  
Endocrine regulation of reproduction. Cellular and molecular aspects of gametogenesis, folliculogenesis, sexual cycles, fertilization, sex differentiation, gestation, and parturition. Technology to regulate reproduction.

407 Food and Animal Toxicology  
Fall. 3(3-0) P: BS 161 or LB 145 or BS 181H R: Not open to freshmen or sophomores.  

413 Monogastric Animal Nutrition  
Spring. 3(3-0) P: ANS 313 RB: BMB 200 or BMB 401 R: Not open to freshmen or sophomores.  
Digestive processes and nutrient metabolism in monogastric animals. Metabolic basis for nutrient requirements.

414 Advanced Animal Breeding  
Spring. 2(2-0) P: ANS 314 R: Not open to freshmen or sophomores.  
Application of selection principles and mating systems within and among breeds of livestock. Selection index, expected progeny differences, animal models, crossbreeding systems, multiple ovulation and embryo transfer schemes, multiple trait selection, simulated populations.

415 Growth and Musculoskeletal Biology  
Spring. 3(3-0) RB: ANS 315 R: Not open to freshmen or sophomores.  

416 Meat Science and Muscle Biology  
Fall. 2(2-0) P: ANS 315 R: Not open to freshmen or sophomores.  
Structure, composition, development and function of muscle and its conversion to meat. Properties of fresh and processed meat. Microbiology, preservation, palatability, inspection and sanitation, nutritive value, and by-products.

417 Topics in Toxicology  
Spring. 1(1-0) RB: ANS 407 R: Not open to freshmen or sophomores.  
Selected topics including regulatory toxicology, risk assessment, environmental toxicology, food safety, and safe handling of toxic substances.

418 Comprehensive Nutrient Management Planning  
Fall. 3(2-2) Interdepartmental with Biosystems Engineering, Administered by Animal Science. P: (BS 161 or LB 145 or BS 181H) and (CEM 143 or CEM 251) RB: CSS 210  
Comprehensive nutrient management plans (CNMP) for animal feeding operations. Trends in animal production, environmental issues, and diet formulation and their impact on manure production. Development of CNMP for a specific animal feeding operation.

422 Advanced Beef Cattle Feedlot Management  
Fall. 3(2-2) P: ANS 222  
Feedlot management systems and issues. Feed systems, manure management, health maintenance, and cattle marketing. Field Trips required.

425 Animal Biotechnology  
Spring. 3(3-0) P: (BS 161 or BS 181H or LB 145) and (CEM 143 or CEM 251) RB: na  
Application of molecular biology concepts to the improvement of domestic animals. Transgenic animal production, molecular genetics and marker assisted selection, animal cloning, Epigenetics, Assisted Reproductive Technologies (ART).

427 Environmental Toxicology and Society  
Spring of odd years. 3(3-0) Interdepartmental with Environmental Engineering and Sociology, Administered by Animal Science. RB: ISB 200 or ISB 202 or ISB 204 or ISB 206H or BMB 200 or BS 111 or BS 110  
Impact of environmental chemicals on health and modern society. Cellular and organ functions and their interface with the environment. Limitations of scientific investigation and environmental regulations.

432 Advanced Dairy Cattle Management  
Fall. 3(2-2) P: ANS 232 RB: ANS 313 R: Not open to freshmen or sophomores. SA: ANS 498  
Management techniques for operating a dairy herd. Mastitis control, reproductive and nutrition management, records, and general herd health.

435 Mammary Physiology  
Spring. 4(3-2) P: BS 161 or LB 145 or BS 181H RB: ANS 315 R: Not open to freshmen or sophomores.  

442 Advanced Horse Management  
Spring. 3(2-2) P: ANS 242 RB: ANS 313 R: Not open to freshmen or sophomores. SA: ANS 498  
Management of stables and breeding farms. Pedigree and conformational selection, reproduction, Promotion, marketing, economics. Nutrition and feeding, facilities, and herd health.

445 Equine Exercise Physiology  
Fall. 4(3-2) RB: ANS 313 and ANS 315 Research in equine exercise science. Physical, physiologic, metabolic and mental adaptation to athletic training. Nutrition and bioenergetics of muscle metabolism.

455 Avian Physiology  
Spring. 4(3-3) RB: ANS 315 R: Open only to juniors or seniors or graduate students.  
Systemic and comparative physiology of birds: respiration, reproduction, endocrinology, digestion, urination, and the senses.

464 Statistics for Biologists  
Fall. 3(3-0) Interdepartmental with Crop and Soil Sciences and Statistics and Probability, Administered by Statistics and Probability. RB: STT 421  
Biological random variables. Estimation of population parameters. Testing hypotheses. Linear correlation and regression. Analyses of counted and measured data to compare several biological groups including contingency tables and analysis of variance.

472 Advanced Swine Management  
Spring of even years. 3(2-2) P: ANS 272 R: Not open to freshmen or sophomores. SA: ANS 498  
Management techniques for operating a swine herd. Management of reproduction and nutrition, records, and general herd health. Integration of husbandry and business principles for decision making. Field Trips required.

475 Aquaculture  
Spring. 3(3-0) Interdepartmental with Fisheries and Wildlife, Administered by Fisheries and Wildlife. RB: ANS 313 or ZOL 355  
Propagation and rearing of aquatic organisms used for food, bait and recreational fisheries management. Culture principles and techniques for important aquatic species. Commercial potential.

480 Animal Systems in International Development  
Fall, Spring, Summer. 3(3-0) A student may earn a maximum of 6 credits in all enrollments for this course. R: Not open to freshmen. Approval of department; application required.  
Animal systems in various global regions. Output, land and resource conservation, and socio-economic factors.

482 Advanced Companion Animal Management  
Spring. 3(2-2) P: ANS 282 RB: ANS 305 or ZOL 313  
Animal behavior, training, housing, and showing. Diseases and genetics of companion animals.

483 Ruminant Nutrition  
Spring. 3(3-0) P: ANS 313 RB: (ANS 315 or concurrently) and ((BMB 200 or concurrently) or (BMB 401 or concurrently)) R: Not open to freshmen or sophomores.  
Nutrition, physiology and metabolism in ruminants. Prehension, digestion, metabolism, absorption, and distribution of nutrients for productive functions. Feeding management strategies and diet formulation. Field trip may be required.

490 Independent Study  
Fall, Spring, Summer. 1 to 4 credits.  
A student may earn a maximum of 8 credits in all enrollments for this course. RB: ANS 210 and (ANS 313 and ANS 314 and ANS 315) R: Open only to juniors or seniors. Approval of department; application required.  
Independent study in genetics, nutrition, physiology, toxicology, meat science, or management of poultry, livestock, or horses.
Animal Science—ANS

492 Undergraduate Research in Animal Science
Fall, Spring, Summer. 3(0-6) A student may earn a maximum of 6 credits in all enrollments for this course. P: (BS 161 or LB 145 or BS 181H) and (CEN 143 or CEN 251) and (ANS 313 or ANS 314 or ANS 315) R: Not open to freshmen or sophomores. Faculty supervised research in selected areas of animal science.

493 Professional Internship in Animal Science
Fall, Spring, Summer. 3 credits. A student may earn a maximum of 6 credits in all enrollments for this course. A student may earn a maximum of 6 credits in all enrollments for any or all of these courses: ABM 493, AEE 493, ANR 493, ANS 493, CMP 493, CSS 493, EEP 493, FIM 493, FSC 493, FW 493, HRT 493, PKG 493, PPL 493, PRR 493, and ESA 493. R: Open to juniors or seniors in the Animal Science major. Approval of department; application required. Supervised professional experience in the animal industry.

499 Senior Thesis in Animal Science
Fall, Spring, Summer. 3 to 9 credits. A student may earn a maximum of 9 credits in all enrollments for this course. RB: ANS 411 and ANS 431 and ANS 435 and ANS 436 and ANS 437 and ANS 412 and ANS 413 and ANS 414 R: Open only to seniors. Approval of department; application required. Maximum of 10 credits may be earned in ANS 499 and ANS 490.

511 Animal Science for Veterinarians
Fall. 2(2-0) R: Open only to graduate professional students in the College of Veterinary Medicine. Husbandry of domestic, laboratory, and zoo animals. Managerial systems in animal agriculture. Production and management goals.

805 Animal Welfare Assessment
Fall, Spring. 3(3-0) Interdepartmental with Zoology. Administered by Animal Science. RB: (ANS 305 or ZOL 313) or background in animal science or zoology including exposure to topics such as animal behavior, physiology, management, and husbandry. Multidisciplinary online computer-based instruction in animal welfare science and related issues including physiology, behavior, human-animal interactions, suffering and pain, ethics, health, assessment and standards, and economics.

810 Gastrointestinal Microbiology of Domestic Animals
Fall. 3(3-0) Microbial ecology of gastrointestinal tract. Microbial role in nutrition, health, and productivity. Environmental applications. Livestock species emphasized.

814 Advanced Statistics for Biologists

816 Integrative Toxicology: Mechanisms, Pathology and Regulation
Fall of odd years. 3(3-0) Interdepartmental with Biochemistry and Molecular Biology and Pathobiology and Diagnostic Investigation and Pharmacology and Toxicology. Administered by Pharmacology and Toxicology. P: PHM 819 Biochemical, molecular, and physiological mechanisms of toxicity. Functional and pathological responses of major organ systems to chemical insult. Mechanisms of mutagenesis, carcinogenesis, and reproductive toxicity. Concepts in risk and safety assessment.

824 Methods of Quantitative and Molecular Genetics for Livestock
Spring of odd years. 3(2-2) RB: ANS 404 Quantitative and molecular methods for animal geneticists. Identification and evaluation of molecular markers, genome maps, linkage and segregation analyses, optimal mating designs, and marker-quantitative trait loci associations in livestock species.

825 Animal Biotechnology
Spring of even years. 3(3-0) R: Approval of department; application required. Basic concepts in animal biotechnology. Application of molecular biology to animal studies. Current topics in animal biotechnology and use of animals in pharmaceutical development.

827 Integrated Risk Assessment of Environmental Hazards
Spring of odd years. 3(3-0) Interdepartmental with Environmental Engineering. Administered by Animal Science. R: Open only to graduate students in the College of Agriculture and Natural Resources or College of Engineering or College of Human Medicine or College of Natural Science or College of Osteopathic Medicine or College of Veterinary Medicine. Alternative approaches to assessing environmental and health risk. Analyzing, interpreting, and using scientific data from ecology, agriculture, environmental chemodynamics, biology, geological sciences, and toxicology in the risk assessment process.

842 Population Genetics, Genealogy and Genomics
Fall. 3(3-0) Interdepartmental with Crop and Soil Sciences and Forestry and Fisheries and Wildlife and Genetics and Horticulture. Administered by Forestry. RB: Pre-calculus, basic genetics. Population genetic processes underlying patterns of molecular genetic variation. Genealogical approaches to the study of genomic diversity, phylogenetic reconstruction, and molecular ecology.

890 Advanced Independent Study
Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 8 credits in all enrollments for this course. R: Approval of department; application required. Investigation of topics of special interest.

898 Master's Research
Fall, Spring, Summer. 1 to 6 credits. A student may earn a maximum of 10 credits in all enrollments for this course. R: Open only to master's students in the Department of Animal Science. Approval of department; application required. Scholarly project for non-thesis (Plan B) master's degree.

899 Master's Thesis Research
Fall, Spring, Summer. 1 to 6 credits. A student may earn a maximum of 99 credits in all enrollments for this course. R: Open only to master's students in the Department of Animal Science. Approval of department. Master's thesis research.

901 Selected Topics in Animal Breeding and Genetics
Fall, Spring, Summer. 1 to 2 credits. A student may earn a maximum of 6 credits in all enrollments for this course. Selected topics of current interest and importance in animal breeding and genetics.

935 Nutrition: Lipid and Carbohydrate Metabolism
Fall of even years. 3(3-0) Interdepartmental with Human Nutrition and Foods. Administered by Human Nutrition and Foods. Regulatory aspects of lipid and carbohydrate metabolism as influenced by nutritional status.

936 Protein Nutrition and Metabolism

999 Doctoral Dissertation Research
Fall, Spring, Summer. 1 to 24 credits. A student may earn a maximum of 99 credits in all enrollments for this course. R: Open only to doctoral students in the Department of Animal Science. Approval of department. Doctoral dissertation research.