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.

200C 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

200D 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 020B

200E Introductory Animal Welfare Assessment
Fall. 1(0-2) A student may earn a maximum of 8 credits in all or any enrollments in 200A, 200C, 200D, 200E, 300A, 300B, 300C, 300D, or 300E. RB: (ANS 305 or ZOL 313) and ANS 110 R: Not open to freshmen.
Physiological and behavioral indicators of animal welfare. Quantitative measures and ethical issues. Written and oral assessments of animal welfare.

200F Dairy Farm Evaluation
Fall. 1(0-2) A student may earn a maximum of 0 credits A student may earn a maximum of 8 credits in the group. Reenrollment Group Course List: in any or all enrollments of ANS 200A, 200C, 200D, 200E, 200F, 300A, 300B, 300C, 300D, 300E or 300F. P: ANS 232 or concurrently Evaluation of dairy farm management. Preparation for collegiate competition. Field trip required.

211 Animal and Product Evaluation
Fall. 3(0-3) R: Not open to freshmen.

212 Merchandising Purebred Livestock
Spring of odd years. 2(1-2) RB: ANS 110 Purebred livestock industry. Private treaty and auction sales. Advertising, animal selection and budgeting of purebred livestock sales.

215 Growth, Health and Lactation in Dairy Cattle
Fall. 3(1-4) P: ANS 110 Evaluation of breeding stock, market animals and carcasses. Performance records and structural correctness of breeding animals. Quality grading, yield grading and pricing of market animals and carcasses.

222 Introductory Beef Cattle Management
Spring. 3(2-2) RB: ANS 110 Not open to students with credit in ANS 422.
Management practices and systems for beef herds. Feed requirements, reproduction, breeding, performance testing, housing, and diseases. Costs and returns.

225 Horse Behavior and Welfare
Summer. 2(2-0) RB: ANS 242 Natural behavior, senses, training psychology, and common behavioral problems of horses. Equine welfare issues.
Animal Science—ANS

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 068
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. 2(2-0) P: ANS 203 R: Open to students in the Institute of Agricultural Technology. SA: ANS 078
Nutritional 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-ies. Feed requirements, reproduction, breeding, housing and disease.

261 Principles of Animal Environments
Spring. 2(1-2) Interdepartmental with Agricultural Engineering. Administered by Agricultural Engineering. SA: AE 061, ATM 261

262 Introductory Sheep Management
Spring. 3(2-2) R: Open only to sophomores or juniors or seniors.
Principles of sheep management: genetics, reproduction, nutrition, marketing, and economics. Field Trips required.

272 Introductory Swine Management
Fall. 3(2-2) Not open to students with credit in ANS 472.
Swine production principles, practices, technologies, and systems. Field Trips required.

280 Introduction to International Animal Agriculture
Spring. 3(3-0) RB: ANS 110

282 Companion Animal Biology and Management
Fall. Spring. 3(3-0)
Principles of companion animal management. Breeds, reproduction, feeding, housing, health, and diseases.

290 Independent Study in Agricultural Science

300E Animal Welfare Judging
Fall. 10(0-4) A student may earn a maximum of 8 credits in any or all enrollments of ANS 200A, 200C, 200D, 200E, 300A, 300C, 300D, or 300E. P: ANS 200E RB: ANS 110 and (ANS 305 or ZOL 313) R: Not open to freshmen.
Enhanced understanding of the physiological and behavioral indicators of animal welfare. Ethical values in the assessment of welfare status. Intercollegiate competition. Field trip required.

302F Advanced Dairy Farm Evaluation
Spring. 2(0-4) A student may earn a maximum of 8 credits in any or all enrollments of ANS 200A, ANS 200C, ANS 200D, ANS 200E, ANS 300A, ANS 300C, ANS 300D, ANS 300E or 300F. P: (ANS 200F and ANS 432) and (ANS 430 or concurrently) RB: ANS 313 R: Not open to freshmen or sophomores. Approval of department.
Evaluation of factors important in successful management of a dairy farm business. Represent Michigan State University in intercollegiate competition. Field trips required.

303 Professional Development in Animal Science II
Fall. 2(1-2) P: (ANS 101 and ANS 110) and completion of Tier I writing requirement R: Open to juniors or seniors in the Department of Animal Science.

305 Applied Animal Behavior
Spring. 3(2-2) P: BS 161 or LB 145 or BS 181H
Techniques for assessing health and welfare of domestic animals based on their behavior.

309 Animal Health and Disease Management

313 Principles of Animal Feeding and Nutrition
Fall. 4(3-2) P: (BS 161 or LB 145 or BS 181H) and completion of Tier I writing requirement and (CIE 143 or concurrently) or (CIE 251 or concurrently) Comparative nutrition and metabolism for production, health, and stewardship of cattle, horses, swine, poultry, dogs and cats. Diet evaluation and formulation. Feeding management.

314 Genetic Improvement of Domestic Animals
Fall. Spring. 4(4-0) P: (BS 161 or BS 181H or LB 145) and completion of Tier I writing requirement and (STT 201 or STT 202 or STT 421 or STT 464 or STT 231)
Molecular, Mendelian, population, and quantitative genetics of domestic animals.
Animal Science—ANS

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 6 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.

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 (CEM 143 or CEM 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, PLP 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 313 and ANS 314 and ANS 315 R: Open only to seniors. Approval of department; application required. Maximum of 10 credits may be earned in ANS 499 and ANS 490.
Individual studies in an area of choice with both oral and written final communications. Topic to be determined by student and guidance committee.

511 Animal Science for Veterinarians
Fall. 2(2-0) R: Open only to graduate-professional students in the College of Veterinary Medicine.

805 Animal Welfare Assessment
Fall. 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.

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 619.

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.

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.

840 Advanced Bayesian Inference Using Monte Carlo Methods for Quantitative Biologists
Fall of even years. 2(2-2) Interdepartmental with Fisheries and Wildlife and Statistics and Probability. Administered by Fisheries and Wildlife. RB: (STT 814 and ZOL 851) or equivalent courses. R: Not open to undergraduate students.

890 Advanced Independent Study
Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 6 credits in all enrollments for this course. R: Approval of department; application required.
Investigation of topics of special interest.

892 Food Science and Animal Science Seminar
Fall, Spring. 1(1-0) A student may earn a maximum of 4 credits in all enrollments for this course. Interdepartmental with Food Science. Administered by Food Science. R: Open to graduate students in the Department of Animal Science or in the Department of Food Science and Human Nutrition.
Critical review of literature. Organization and communication of scientific data in food science and animal science.

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 masters 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 masters 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
Spring of odd years. 3(3-0) Interdepartmental with Human Nutrition and Foods. Administered by Animal Science.
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.