Descriptions—American Thought and Language of Courses

195H. Writing: Major Topics in American Thought
Fall, Spring. 4(4-0) P: Designated score on English placement test. Not open to students with credit in MC 111 or MC 112 or LBS 133 or AL 192 or AL 192H or ATL 110 or ATL 115, ATL 120 or ATL 125 or ATL 130 or ATL 135 or ATL 140 or ATL 145 or ATL 150. Drafting, revising, and editing compositions derived from readings on major topics in American thought to develop advanced skills in narration, persuasion, analysis, and documentation.

290. Independent Study
Fall, Spring, Summer. 1 to 4 credits. R: Open only to freshmen or sophomores. Approval of department. Special projects arranged by an individual student and a faculty member in areas supplementing regular course offerings.

ANATOMY

ANATOMY ANT

Department of Anatomy
College of Human Medicine
College of Osteopathic Medicine
College of Veterinary Medicine

316. General Human Anatomy
Spring. 3(3-0) P: BS 110 or BS 111 or approval of department. Human structure. Major systems of the human body.

480. Special Problems in Anatomy
Fall, Spring, Summer. 1 to 5 credits. A student may earn a maximum of 15 credits in all enrollments for this course. R: Approval of department. Topics from an anatomical field such as gross anatomy, histology, tissue culture, cytology, neurology, or embryology.

515. Comparative Veterinary Gross Anatomy
Fall. 6(2-10) R: Open only to graduate-professional students in the College of Veterinary Medicine. Canine anatomy. Comparisons with ruminant, porcine, and equine anatomy.

516. Veterinary Histology and Cell Biology
Fall. 4(3-2) R: Open only to graduate-professional students in the College of Veterinary Medicine. Principles of developmental, cellular, and molecular biology as related to veterinary medicine.

517. Veterinary Neuroanatomy
Spring. 1(1-0) R: Completion of 1 semester of the graduate-professional program in the College of Veterinary Medicine. Introduction to the anatomy of the nervous system using the canine species as a model.

551. Medical Gross Anatomy
Fall. 6(4-6) R: Graduate-professional students in colleges of Human Medicine and Osteopathic Medicine. Gross anatomy of the human body using projections, medical imaging, clinical correlations, case studies, video tapes, and computer aided instruction.

552. Medical Neuroscience
Spring. 4(3-2) Interdepartmental with Physiology; Radiology. R: Graduate-professional students in colleges of Human Medicine and Osteopathic Medicine. Correlation of normal structure and function of the human nervous system with clinical testing, classical lesions, and common diseases.

562. Medical Histology
Spring. 3(2-2) R: Graduate-professional students in colleges of Human Medicine and Osteopathic Medicine. Histology of the human body.

585. Human Gross Anatomy Dissection
Fall, Spring, Summer. 2 to 7 credits. A student may earn a maximum of 15 credits in all enrollments for this course. P: ANT 551. R: Graduate-professional students in colleges of Human Medicine and Osteopathic Medicine. Dissection of selected regions of the human body.

610. Veterinary Gross Anatomy
Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 6 credits in all enrollments for this course. R: Open only to graduate-professional students in the College of Veterinary Medicine. Approval of department. Veterinary gross anatomy, cell biology, histology, or neurobiology.

802. Clinical Surgical Anatomy

811. Research Problems in Veterinary Anatomy
Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 6 credits in all enrollments for this course. R: Open only to graduate-professional students in the College of Veterinary Medicine. Approval of department. Veterinary gross anatomy, cell biology, histology, or neurobiology.

820. Advanced Neuroanatomy
Summer of odd years. 1 to 5 credits. A student may earn a maximum of 8 credits from ANS 200A, ANS 200B, ANS 300A, ANS 300B, ANS 300C and ANS 300D. Evaluation of functional conformation of beef cattle, sheep and swine and their carcasses. Preparation for intercollegiate competition. Field trips required.

ANIMAL SCIENCE

ANIMAL SCIENCE ANS

Department of Animal Science
College of Agriculture and Natural Resources

110. Introductory Animal Agriculture
Fall, Spring. 4(3-2) 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.

112. 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. P: ANS 211. R: A student may earn a maximum of 8 credits from ANS 200A, ANS 200B, ANS 300A, ANS 300B, ANS 300C and ANS 300D. Evaluation of functional conformation of beef cattle, sheep and swine and their carcasses. Preparation for intercollegiate competition. Field trips required.

200A. Introductory Judging of Dairy Cattle or Horses
Spring. 1 to 2 credits. A student may earn a maximum of 3 credits in all enrollments for this course. R: A student may earn a maximum of 8 credits from ANS 200A, ANS 200B, ANS 300A, ANS 300B, ANS 300C and ANS 300D. Evaluation of functional conformation of dairy cattle or horses. Preparation for intercollegiate competition. Field trips required.
210. Animal Products  
Fall. 4(3-3) R: Not open to freshmen.  

211. Animal and Product Evaluation  
Fall. 3(1-4)  
Evaluation of breeding stock, market animals and carcasses. Production records and soundness of breeding animals. Quality grading, yield grading and pricing of market animals and carcasses.

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. Field trips required.

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. Field trips required.

232. Introductory Dairy Cattle Management  
Fall. 3(2-2) Not open to students with credit in ANS 422.  
Principles and techniques of dairy herd management including calf and heifer care plus lactating and dry cow management.

242. Introductory Horse Management  
Fall. 3(2-2) Not open to students with credit in ANS 422.  
Principles of horse management. Reproduction, nutrition, herd health, genetics, economics, marketing. Field trips required.

252. Introduction to Management of Avian Species  
Fall of odd years. 3(2-2)  
Management of commercial poultry flocks and avian species. Feed requirements, reproduction, breeding, housing and disease.

261. Principles of Animal Environments  
Spring. 2(1-2) Interdepartmental with Agricultural Technology and Systems Management. Administered by Agricultural Technology and Systems Management.  

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.

275. Seafood Systems Management  
Spring. 3 credits. Interdepartmental with Fisheries and Wildlife. Administered by Fisheries and Wildlife.  
Domestic and international perspectives on major aquatic foods. Cultural and nutritional value; wild harvest; aquaculture; processing technology; food handling and food safety.

300A. Advanced Livestock Judging  
Fall of even years. 2 credits. P: ANS 200A, R: Not open to freshmen. A student may earn a maximum of 8 credits from ANS 200A, ANS 200B, ANS 300A, ANS 300B, ANS 300C and ANS 300D.  
Evaluation of conformation and performance records of beef cattle, swine and sheep. Represent MSU in intercollegiate competition. Field trips required.

300B. Advanced Meat Evaluation and Grading  
Fall. 2(0-4) P: (ANS 200A) R: Not open to freshmen. A student may earn a maximum of 8 credits from ANS 200A, ANS 200B, ANS 300A, ANS 300B, ANS 300C and ANS 300D.  
Evaluation of carcasses and wholesale cuts according to industry standards. Federal grading standards. Field trips to meat packing operations required. Represent MSU in intercollegiate competition. Field trips required.

300C. Advanced Dairy Cattle Judging  
Fall. 2 credits. P: ANS 200B, R: Not open to freshmen. A student may earn a maximum of 8 credits from ANS 200A, ANS 200B, ANS 300A, ANS 300B, ANS 300C and ANS 300D.  
Evaluation of conformation of various breeds of dairy cattle. Represent MSU in intercollegiate competition. Field trips required.

300D. Advanced Horse Judging  
Fall. 2 credits. P: ANS 200B, R: Not open to freshmen. A student may earn a maximum of 8 credits from ANS 200A, ANS 200B, ANS 300A, ANS 300B, ANS 300C and ANS 300D.  
Evaluation of functional characteristics of horses. Represent MSU in intercollegiate competition. Field trips required.

305. Applied Animal Behavior  
Spring. 2(2-0) P: (BS 111)  
Techniques for assessing health and welfare of domestic animals based on their behavior.

313. Principles of Animal Feeding and Nutrition  
Fall. 4(3-2) P: (BS 111) and (CEM 143 or concurrently or CEM 251 or concurrently) and completion of Tier 1 writing requirement.  

314. Genetic Improvement of Domestic Animals  
Fall. 4(3-2) P: (BS 111) and (MTH 110 or concurrently or MTH 116 or concurrently) and completion of Tier 1 writing requirement.  
Molecular, Mendelian, population, and quantitative genetics of domestic animals.
Descriptions—Animal Science

Courses

415. Growth and Musculoskeletal Biology
Spring. 3(3) R: 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 and 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. 3(1-0) Interdepartmental with Food Science. P: ANS 407. R: Not open to freshmen and sophomores.
Selected topics including regulatory toxicology, risk assessment, environmental toxicology, food safety, and safe handling of toxic substances.

422. Advanced Beef Cattle Feedlot Management
Fall. 3(2-2) P: (ANS 222) and (ANS 313 or concurrently or ANS 314 or concurrently or ANS 315 or concurrently)
Feedlot management systems and issues. Feed systems, manure management, health maintenance, and cattle marketing. Field trips required.

425. Principles of Animal Biotechnology
Fall of odd years. 3(3-0) P: (BS 111) and (CEM 143 or concurrently or CEM 251 or concurrently)
Application of molecular biology concepts to the improvement of domestic animals. Transgenic animal production, molecular genetics and marker assisted selection.

427. Environmental Toxicology and Society
Spring of odd years. 3(3-0) Interdepartmental with Civil and Environmental Engineering; and Sociology. P: (IBS 200 or IBS 202 or IBS 204 or IBS 206H or BCH 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 222) R: Not open to freshmen or sophomores.
Management techniques for operating a dairy herd. Mastitis control, reproductive and nutrition management, records, and general herd health. Field trips required.

442. Advanced Horse Management
Spring. 3(2-2) P: (ANS 242) R: Not open to freshmen or sophomores.

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

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

464. Statistical Methods for Biologists I

465. Statistical Methods for Biologists II
Concepts of reducing experimental error: covariance, complete and incomplete block designs, latin squares, split plots, repeated-measures designs, regression applications, and response surface designs.

472. Advanced Swine Management
Fall of even years. 3(3-0) P: (ANS 272) R: Not open to freshmen or sophomores.
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.

480. Animal Systems in International Development
Fall, Spring, Summer. 3(3) A student may earn a maximum of 6 credits in all enrollments for this course. P: (ANS 313 or ANS 314 or ANS 315) R: Not open to freshmen. Approval of department; application required.
Animal systems in various global regions. Output, land and resource conservation, and socioeconomic factors.

483. Ruminant Nutrition
Spring. 3(3-0) P: ANS 313, ANS 315. R: Not open to freshmen and sophomores.
Physiology and metabolism in ruminants. Pre-hension, 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. P: ANS 210; ANS 313 or ANS 314 or ANS 315. R: Open only to juniors and seniors. Approval of department; application required.
Independent study in genetics, nutrition, physiologic, toxicology, meat science, or management of poultry, livestock, horses.

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. R: Open only to juniors or seniors in the Animal Science major. Approval of department; application required. A student may earn a maximum of 6 credits in the following courses: AEE 483; ANR 483; ANS 483; FW 493; PRR 493; and RD 493. 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. P: ANS 313, ANS 314, 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. Husbandry of domestic, laboratory, and zoo animals. Managerial systems in animal agriculture. Production and management goals.

513. Animal Nutrition for Veterinarians
Spring. 2(2-0) R: Open only to graduate-professional students in the College of Veterinary Medicine.
Nutrition for domestic animals and wildlife. Comparative nutrient digestion and metabolism. Nutritive requirements for maintenance, growth, reproduction, lactation, and work.

807. Advanced Food Toxicology
Fall of even years. 3(3-0) Interdepartmental with Food Science; and Human Nutrition and Foods. Administered by Food Science. R: Approval of department.
Toxicology related to food safety. Metabolism of toxicants as influenced by food constituents, mutagenesis, and chemical carcinogenesis. Risk assessment.

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.
813. Techniques in Animal Biotechnology
Spring of odd years. 3(2-2) P: BCH 462 or BCH 472. R: Approval of department; application required.
Basic molecular biology procedures with emphasis on mammalian systems.

824. Methods of Quantitative and Molecular Genetics for Livestock
Spring of odd years. 3(2-2) P: (ANS 404) Quantitative and molecular methods for animal populations. Techniques 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.

826. Livestock Immunogenetics
Fall of odd years. 4(3-2) P: (ANS 404 or ANS 425) Evaluation and exploration of indicator traits and candidate genes of immunocompetence that contribute to resistance or susceptibility to infectious diseases of livestock.

827. Integrated Risk Assessment of Environmental Hazards
Spring of odd years. 3(3-0) 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.

841. Advanced Endocrine Physiology and Pharmacology
Fall. 4(4-0) Interdepartmental with Physiology; Pharmacology and Toxicology; and Psychology. Administered by Physiology. P: BCH 461, PSL 412. R: Open only to graduate students in the Colleges of Human Medicine, Osteopathic Medicine, Veterinary Medicine, Natural Science, and Agriculture and Natural Resources.
Basic and advanced concepts of endocrine and reproductive physiology and pharmacology.

842. Population Genetics, Genealogy and Genomics
Fall. 3(3-0) Interdepartmental with Forestry; Crop and Soil Sciences; Genetics; and Fisheries and Wildlife; Horticulture. Administered by Forestry. RB: Pre-calculus, basic genetics.

883. 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.

890. Advanced Independent Study
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 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 Animal Science. Approval of department.

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.

895. 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.

909. Nutrition: Metabolism and Function of Vitamins
Spring of odd years. 3(3-0) Interdepartmental with Human Nutrition and Foods. Administered by Human Nutrition and Foods.
Regulatory roles of vitamins at cellular and molecular levels.