

AGRICULTURE AND NATURAL RESOURCES

**475\*. International Studies in Agriculture and Natural Resources**  
 Fall, Spring, Summer. 2 to 6 credits.  
 May reenroll for a maximum of 6 credits.  
 R: Approval of college; application required.

Study-travel experience emphasizing contemporary problems affecting agriculture and natural resources in the world, national and local communities. Case studies and interviews with officials, community leaders and leading professionals.  
 QA: ANR 475

**481\*. Agricultural Research Systems in Developing Countries**  
 Summer. 2(2-0) Interdepartmental with the Department(s) of Agricultural Economics, Animal Science, Crop and Soil Sciences.  
 R: Open only to seniors and graduate students in the College of Agriculture and Natural Resources.

Planning, organizing and managing agricultural research systems. Problems and alternative reforms to improve research productivity. Adapting new agricultural technology in developing countries.  
 QA: ANR 480

**489\*. Integrated Approaches to Agriculture and Natural Resources Problems**  
 Fall, Spring. 3(2-2)  
 P: MTH 110 or MTH 116; EC 201 or EC 202. R: Open only to seniors in the College of Agriculture and Natural Resources.

Holistic solutions to resource management and allocation emphasizing an integrated, multidisciplinary team approach to case study problems.  
 QP: MTH 109 ORMTH 110ORMTH 111

**491\*. Selected Topics**  
 Fall, Spring, Summer. 1 to 4 credits.  
 May reenroll for a maximum of 6 credits.  
 R: Not open to freshmen and sophomores

Special topics in agriculture and natural resources.  
 QA: ANR 480

**493\*. Professional Internship in Agriculture and Natural Resources**  
 Fall, Spring, Summer. 3(-) May reenroll for a maximum of 6 credits.  
 R: Open only to juniors and seniors in the College of Agriculture and Natural Resources. Approval of department; application required.

Supervised professional experiences in agencies and businesses related to student's major field of study.  
 QA: ANR 399

**AMERICAN STUDIES AMS**

**491\*. Perspectives in American Studies**  
 Fall. 3(3-0) May reenroll for a maximum of 6 credits.  
 R: juniors-seniors

Methods and significant works in American Studies for majors.  
 QA: AMS 410

**492\*. Seminar in American Studies**  
 Spring. 3(3-0) May reenroll for a maximum of 6 credits.  
 R: Juniors and seniors Arts and Letters,

James Madison  
 Seminar approach to selected topics in American life emphasizing interdisciplinary approaches. Topics vary.  
 QA: AMS411

**881\*. American Studies Theory, Methods, Bibliography**  
 Fall. 3(3-0)  
 R: Graduate Arts & Letters American Studies

Methods and bibliographical sources of American Studies research. Interdisciplinary approaches to studying American culture.  
 QA: AL 801

**890\*. Independent Study**  
 Fall, Spring, Summer. 1 to 4 credits.  
 May reenroll for a maximum of 12 credits.  
 R: Approval of the program director

Special projects, directed reading, and research arranged by an individual graduate student and a faculty member in areas supplementing regular course offerings.  
 QA: A L 803

**891\*. Special Topics in American Studies**  
 Fall, Spring, Summer. 4(04-00) May reenroll for a maximum of 12 credits.  
 R: Approval of the program director

Special topics supplementing regular course offerings proposed by faculty on a group study basis for graduate students.  
 QA: A L 802

**899\*. Master's Thesis Research-Plan A**  
 Fall, Spring, Summer. 1 to 6 credits.  
 May reenroll for a maximum of 6 credits.  
 R: Approval of the program director

Directed research leading to a master's thesis, used in partial fulfillment of plan A master's degree requirements.

**AMERICAN THOUGHT AND LANGUAGE ATL**

There will be 4 credit Tier One writing courses numbered ATL 110 and higher.

There will be a 4 credit Honors Tier One course numbered ATL 195H.

There will be a developmental Tier One writing course.

**ANATOMY ANT**

**316\*. General Human Anatomy**  
 Spring. 3(-)  
 P: BS 211 or BS 212 R: Approval of Department

Designed to impart the basic concepts of the broad field of anatomy. Special requirements of the various disciplines will be met in their respective laboratories.  
 QP: BS 211 BS 212 QA: ANT 316

**515\*. Comparative Veterinary Gross Anatomy**  
 Fall. 6(2-10)  
 P: Admission to the College of Veterinary Medicine R: College of Veterinary Medicine Veterinary Medicine none

Essentials of canine anatomy with comparisons to ruminant, porcine and equine anatomy.

**516\*. Veterinary Histology and Cell Biology**  
 Fall. 4(3-2)  
 P: Admission to the College of Veterinary Medicine. R: College of Veterinary Medicine

Introduction to the principles of developmental, cellular, and molecular biology relevant to future courses in the veterinary curriculum.

**517\*. Veterinary Neuroanatomy**  
 Spring. 1(1-0)  
 P: Admission to the College of Veterinary Medicine. R: College of Veterinary Medicine Veterinary Medicine none

Introduction to the anatomy of the canine nervous system.

**551. Medical Gross Anatomy**  
 Fall. 7(4-6)  
 R: Graduate-professional students in colleges of Human 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 the Department(s) of Physiology, Radiology.  
 R: Graduate-professional students in colleges of Human 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 and Osteopathic Medicine.

Histology of the human body.

**585. Human Gross Anatomy Dissection**  
 Fall, Spring, Summer. 2 to 7 credits.  
 May reenroll for a maximum of 15 credits.  
 P: ANT 551 R: Graduate-professional students in colleges of Human and Osteopathic Medicine.

Dissection of selected regions of the human body.

**802\*. Clinical Surgical Anatomy**  
 Spring. 6(04-04) Interdepartmental with the Department(s) of Surgery.  
 P: Must be a surgery resident with MD or DO C: Must be in the MSU system

Review of surgical anatomy; the opportunity to obtain detailed anatomical information through lecture and dissection sessions; and the clinical interpretation of anatomy surgical approaches.

**813\*. Problems in Anatomy**  
 Fall, Spring, Summer. 1 to 5 credits.  
 May reenroll for a maximum of 5 credits.  
 P: Approval of department

Various anatomical fields such as gross anatomy, histology, tissue culture, cytology, neurology and embryology will be studied  
 QA: ANT 813

**814\*. Graduate Student Seminar**  
 Spring of even-numbered years. 1 to 3 credits.  
 R: Anatomy graduate program

Supervised practice in delivering and evaluating written abstracts and public oral presentations of anatomical sciences, techniques or organization, timing and effective illustrations  
 QA: ANT 814

**820\*. Advanced Neuroanatomy**  
 Summer of odd-numbered years. 1 to 3 credits. May reenroll for a maximum of 99 credits.  
 P: Permission of instructor

Current topics concerning anatomy and physiology of CNS cells and their processes  
 QP: ANT 815 QA: ANT 820

**ANATOMY**

**839\*.** **Systems Neuroscience**  
 Spring of odd-numbered years.  
 4(04-00) Interdepartmental with the  
 Department(s) of Pharmacology and  
 Toxicology, Physiology.

Anatomy, Pharmacology and physiology of multicellular neural systems, including major sensory, motor, autonomic and chemo-regulatory systems in brains of vertebrates.

**885\*.** **Vertebrate Neural Systems**  
 Spring of odd-numbered years.  
 3(02-02) Interdisciplinary with the  
 Department(s) of Physiology.

Comparative analysis of major component systems of vertebrate brains, their evolution, ontogeny, structure and function in fish, amphibians, reptiles, birds and mammals  
 QA: ANT 885 ANT 886

**899\*.** **Master's Thesis Research**  
 Fall, Spring, Summer. 1 to 12 credits.  
 P: Admission to M.S. degree program in  
 Anatomy R: Anatomy

QA: ANT 899

**999\*.** **Doctoral Dissertation Research**  
 Fall, Spring, Summer. 1 to 12 credits.  
 P: Admission to Ph.D. program in Anatomy  
 R: Anatomy

QA: ANT 999

**ANIMAL SCIENCE ANS**

**110.** **Introductory Animal Agriculture**  
 Fall. 3(2-2)

History of animal agriculture and its relationship to human needs, production systems, marketing, environmental considerations. Current goals of and limitations affecting U.S. animal production.  
 QP: ANS 211

**112.** **Introductory Animal Management**  
 Spring. 3(2-2)  
 P: ANS 110.

Principles of managing beef and dairy cattle, horses, poultry, sheep and swine throughout their life cycles. Topics include genetics, nutrition, reproduction, health, care, and economically efficient production.

**210\*.** **Animal Products**  
 Fall. 4(3-3)  
 P: ANS 110, ANS 112. R: Not open to freshmen.

Edible animal products. Processing, preservation, storage and distribution of dairy, meat, and egg products.  
 QP: ANS 110 ANS 211 QA: ANS 156 FSC 300

**211.** **Animal and Product Evaluation**  
 Spring. 3(1-6)

Fundamentals of animal and product evaluation. Skeletal and muscular anatomy of animals and its relation to function. Oral and written defense of decisions regarding evaluation.

**212\*.** **Merchandising Purebred Livestock**  
 Spring of odd-numbered years. 2(1-2)  
 R: Open only to sophomores, juniors, and seniors.

Purebred livestock industry. Private treaty and auction sales. Advertising, animal selection and budgeting of purebred livestock sales. Field trips required.  
 QA: ANS 318

**262\*.** **Sheep Management**  
 Spring. 3(2-2)  
 R: Open only to sophomores, juniors, and seniors.

Principles of sheep management: genetics, reproduction, nutrition, marketing, and economics. Field trips required.  
 QA: ANS 472

**300A\*.** **Livestock Judging**  
 Fall of even-numbered years. 2(-)  
 P: ANS 211. R: Open only to juniors and seniors.

Evaluation of conformation and performance records of beef cattle, swine and sheep. Represent MSU in intercollegiate competition. Field trips required.  
 QP: ANS 357A ANS 357B QA: ANS 357C

**300B\*.** **Meat Evaluation and Grading**  
 Fall of odd-numbered years. 2(-)  
 P: ANS 211. R: Open only to juniors and seniors.

Evaluation of beef, pork, and lamb carcasses and wholesale cuts according to industry standards. Federal grading standards. Field trips to meat packing operations required. Represent MSU in intercollegiate competition.  
 QP: ANS 257A QA: ANS 257B

**300C\*.** **Dairy Cattle Judging**  
 Fall. 2(-)  
 P: ANS 211. R: Open only to juniors or seniors.

Evaluation of conformation of various breeds of dairy cattle. Represent MSU in intercollegiate competition. Field trips required.  
 QP: ANS 211 QA: ANS 337

**300D\*.** **Horse Judging**  
 Fall. 2(-)  
 P: ANS 211. R: Open only to juniors and seniors.

Evaluation of functional characteristics of horses. Development of oral reasons. Represent MSU in intercollegiate competition. Field trips required.  
 QP: ANS 347A QA: ANS 347B

**310\*.** **Livestock and Product Marketing**  
 Fall. 3(2-2) Interdepartmental with the Department(s) of Agricultural Economics.  
 P: ANS 112 R: Sophomores and above

Movement of livestock into and products through market channels. Market structures, futures, options and current issues. Field trip required.  
 QP: ANS 110 ANS 152 QA: ANS 418

**313\*.** **Principles of Animal Feeding and Nutrition**  
 Fall. 4(3-2)  
 P: CEM 143, PSL 250.

Principles and practices of nutrition for cattle, horses, poultry, sheep and swine. Metabolism of protein, minerals, and vitamins. Diet formulation. Performance prediction. Nutritional maladies. Field trip required.  
 QP: CEM 143 PSL 241 QA: ANS 313A ANS313B

**314\*.** **Genetic Improvement of Farm Animals**  
 Fall. 4(3-2)  
 P: ANS 110, MTH 116. R: Not open to freshmen and sophomores.

Qualitative and quantitative inheritance in domestic farm animals. Statistical concepts and probability related to animal breeding. Improvement of dairy cattle, livestock, and horses through genetics and mating systems.  
 QP: ANS 110 MTH 109ORMTH 110OR QA: ANS 314

**315\*.** **Anatomy and Physiology of Farm Animals**  
 Spring. 4(3-2)  
 P: ANS 112, PSL 250.

Gross and microanatomy of farm animals. Structure directed function of tissues. Endocrine integration for homeostasis. Regulation of growth, lactation, and reproduction. Homeorhesis.  
 QP: ANS 211 PSL 241 QA: ANS 315

**401\*.** **Issues in Animal Agriculture**  
 Spring. 1(1-0)  
 P: ANS 313 or ANS 314 or ANS 315. R: Open only to seniors.

Societal issues related to local, national and international animal agriculture.  
 QP: ANS 313AORANS 313BORANS 314 QA: ANS 310

**405\*.** **Endocrinology of Reproduction**  
 Fall. 3(3-0)  
 P: ANS 315; BCH 200 or BCH 401. R: Not open to freshmen and sophomores.

Endocrine regulation of reproduction. Cellular and molecular aspects of gametogenesis, folliculogenesis, sexual cycles, fertilization, sex differentiation, gestation, and parturition. Technology to regulate reproduction.  
 QP: PSL 241 ANDBCH 200ORBCH 401 QA: ANS 455

**407\*.** **Food and Animal Toxicology**  
 Fall. 3(3-0) Interdepartmental with the Department(s) of Food Science.  
 P: BCH 200 or BCH 401 R: Juniors and above

Fate and effects of chemicals in the food chain including impact on animal production, residues in food products, food safety assessment, and control methods.  
 QP: BCH 200 ORBCH 401 QA: ANS 413A

**407L\*.** **Toxicology Methods Laboratory**  
 Fall. 2(0-4) Interdepartmental with the Department(s) of Food Science.  
 P: ANS 407 or concurrently R: Juniors and above

Laboratory techniques for evaluating potential toxicity of chemicals to living systems. Field trip to industrial toxicology laboratory required.  
 QP: ANS 413A QA: ANS 413B

**410\*.** **Critical Analysis of Issues in Animal Science**  
 Fall. 2(2-0)  
 P: ANS 313 or ANS 314 or ANS 315. R: Open only to seniors.

Traditional animal management practices and evolving technologies. Topics will vary each year.  
 QP: ANS 313 ORANS 314ORANS 315

**413\*.** **Non-Ruminant Nutrition**  
 Spring. 4(3-2)  
 P: ANS 313. R: Not open to freshmen and sophomores.

Nutrition of horses, swine and poultry. Digestive and metabolic development and nutrient requirements. Relationships of genetics, endocrinology, immunology, and environment to nutrition.  
 QP: ANS 313B QA: ANS 483 ANS 463

**414\*.** **Advanced Animal Breeding and Genetics**  
 Spring. 4(3-2)  
 P: ANS 314. R: Not open to freshmen and sophomores.

Application of genetics to animal breeding. Current and potential selection programs and crossbreeding systems of dairy cattle, horse and livestock populations. Expected response to selection methods.  
 QP: ANS 314 QA: ANS 454 ANS 434