Animal Science — Description of Courses

313A. Principles of Animal Nutrition
(ANS 313.) Fall. 4(0-0) BCH 200 or BCH 401, MPH 200, PSL 241.
Requirements for and metabolism of nutrients.
Feeding practices and diets for beef and dairy cattle, horses, poultry, sheep and swine.

313B. Feeds and Diet Formulation
Winter. 2(1-2) ANS 313A.
Feed processing, premixes and feed additives.
Feed manufacture, net energy system. Diet and least cost formulation for cattle, sheep, horses, poultry and swine. Field trips required.

314. Principles of Animal Breeding
Winter. 3(3-0) B S 211 or a course in Mendelian genetics.

315. Principles of Farm Animal Physiology
Spring. 4(2-2) ANS 311, PSL 241.
Anatomy and physiology emphasizing endocrinal integration for homeostasis and homeotherm.
Regulatory interaction among growth, lactation and reproduction during different productive stages of farm animals.

317. Evaluation of Animal Carcasses
Fall. 3(1-4) ANS 110, ANS 152.
Evaluation of carcasses. Evaluation of processed meat products and carcasses. Emphasis on production records and soundness of breeding animals, quality grading, yield grading and pricing market animals and carcasses.

256. Meats, Poultry and Fishery Products I
Fall. 3(2-2) Interdepartmental with and administered by Food Science.
Principles of evaluation and nutritive value. Identification of meats and cuts of beef, veal, lamb and poultry products.

257A. Meat Evaluation and Grading
Winter. 1(0-3) ANS 217. Students may not earn more than 10 credits from the following courses: ANS 257A, ANS 257B, ANS 337, ANS 347A, ANS 347B, ANS 357A, ANS 357B, ANS 357C.
Evaluation of beef, pork and lamb carcasses and wholesale cuts according to industry and consumer demands. Federal grading standards. Field trips to meat packing operations required.

257B. Meat Evaluation and Grading
Fall. 1 to 3 credits. ANS 257A. Students may not earn more than 10 credits from the following courses: ANS 257A, ANS 257B, ANS 337, ANS 347A, ANS 347B, ANS 357A, ANS 357B, ANS 357C.
Evaluation of beef, pork and lamb carcasses and wholesale cuts according to industry and consumer demands. Federal grading standards. Field trips to meat packing operations required.

310. Animal Science Seminar
Fall. 1(2-0) Juniors, ANS 110 or concurrently.
Current and policy issues in animal science.

Animal Science — Description of Courses

313A. Principles of Animal Nutrition
(ANS 313.) Fall. 4(0-0) BCH 200 or BCH 401, MPH 200, PSL 241.
Requirements for and metabolism of nutrients.
Feeding practices and diets for beef and dairy cattle, horses, poultry, sheep and swine.

313B. Feeds and Diet Formulation
Winter. 2(1-2) ANS 313A.
Feed processing, premixes and feed additives. Feed manufacture, net energy system. Diet and least cost formulation for cattle, sheep, horses, poultry and swine. Field trips required.

314. Principles of Animal Breeding
Winter. 3(3-0) B S 211 or a course in Mendelian genetics.

315. Principles of Farm Animal Physiology
Spring. 4(2-2) ANS 311, PSL 241.
Anatomy and physiology emphasizing endocrinal integration for homeostasis and homeotherm. Regulatory interaction among growth, lactation and reproduction during different productive states of farm animals.

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Fall. 3(1-4) ANS 110, ANS 152.
Evaluation of carcasses. Evaluation of processed meat products and carcasses. Emphasis on production records and soundness of breeding animals, quality grading, yield grading and pricing market animals and carcasses.

256. Meats, Poultry and Fishery Products I
Fall. 3(2-2) Interdepartmental with and administered by Food Science.
Principles of evaluation and nutritive value. Identification of meats and cuts of beef, veal, lamb and poultry products.

257A. Meat Evaluation and Grading
Winter. 1(0-3) ANS 217. Students may not earn more than 10 credits from the following courses: ANS 257A, ANS 257B, ANS 337, ANS 347A, ANS 347B, ANS 357A, ANS 357B, ANS 357C.
Evaluation of beef, pork and lamb carcasses and wholesale cuts according to industry and consumer demands. Federal grading standards. Field trips to meat packing operations required.

257B. Meat Evaluation and Grading
Fall. 1 to 3 credits. ANS 257A. Students may not earn more than 10 credits from the following courses: ANS 257A, ANS 257B, ANS 337, ANS 347A, ANS 347B, ANS 357A, ANS 357B, ANS 357C.
Evaluation of beef, pork and lamb carcasses and wholesale cuts according to industry and consumer demands. Federal grading standards. Field trips to meat packing operations required.

310. Animal Science Seminar
Fall. 1(2-0) Juniors, ANS 110 or concurrently.
Current and policy issues in animal science.

Animal Science — Description of Courses

313A. Principles of Animal Nutrition
(ANS 313.) Fall. 4(0-0) BCH 200 or BCH 401, MPH 200, PSL 241.
Requirements for and metabolism of nutrients.
Feeding practices and diets for beef and dairy cattle, horses, poultry, sheep and swine.

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257B. Meat Evaluation and Grading
Fall. 1 to 3 credits. ANS 257A. Students may not earn more than 10 credits from the following courses: ANS 257A, ANS 257B, ANS 337, ANS 347A, ANS 347B, ANS 357A, ANS 357B, ANS 357C.
Evaluation of beef, pork and lamb carcasses and wholesale cuts according to industry and consumer demands. Federal grading standards. Field trips to meat packing operations required.

310. Animal Science Seminar
Fall. 1(2-0) Juniors, ANS 110 or concurrently.
Current and policy issues in animal science.
Description — Animal Science

of Courses

357B. Judging Livestock
Spring. 1 to 3 credits. ANS 357A. Students may not earn more than 10 credits from the following courses: ANS 257A, ANS 257B, ANS 257C, ANS 347A, ANS 347B, ANS 357A, ANS 357B, ANS 357C.
Evaluation of conformation of cattle, pigs and sheep. Productive and functional merits of individual food animals. Field trips to prominent livestock establishments and to major livestock events required.

357C. Judging Livestock
Fall. 1 to 3 credits. ANS 357B. Students may not earn more than 10 credits from the following courses: ANS 257A, ANS 257B, ANS 257C, ANS 347A, ANS 347B, ANS 357A, ANS 357B, ANS 357C.
Evaluation of conformation of cattle, pigs and sheep. Productive and functional merits of individual food animals. Field trips to prominent livestock establishments and to major livestock events required.

400. Independent Study
Fall, Winter, Spring, Summer. 1 to 4 credits. May reenroll for a maximum of 10 credits. Approval of department.
Independent study in genetics, nutrition, physiology, toxicology, experimental design, or management of poultry or livestock.

412A. Intensive Livestock Systems
(ANS 312A.) Fall, 2(1-3) Juniors, ANS 110, FSM 200 or approval of department.
Comprehensive systems in livestock production. Livestock enterprise planning and budgeting. Management decisions relative to purchasing livestock, feeding techniques and record analysis. Students manage livestock. Field trips required.

412B. Intensive Livestock Systems
(ANS 312B.) Winter. 2(1-3) ANS 412A. Continuation of ANS 412A. Computer based surveillance and evaluation of livestock enterprise. Students manage livestock. Field trips required.

413. Toxicology of Food Producing Animals
Spring. 4(4-0) PSL 240, BCH 300.
Fate and effects of toxic chemicals in food-producing animals; impact on animal production; residues in food products, safety assessment and control methods.

415. Animal Reproduction Laboratory
Winter. 1(0-3) ANS 455 or concurrently.

416. Growth Biology of Meat Animals
Spring of even-numbered years. 3(3-0) B S 211, PSL 241, BCH 200.
Fetal and postnatal growth and development in meat animals. Bioenergetic, hormonal, nutritional and metabolic aspects of growth. Criteria for measuring growth of meat animals.

418. Livestock Product Marketing
Spring. 4(3-2) ANS 310, FSM 200.
Interdepartmental with Food Systems Economics and Management.
Structured product values in livestock market channels. Field study analysis of alternative marketing strategies, futures marketing, and the components of the livestock marketing chain. Field trips required.

422. Beef Production and Management
Spring. 4(3-2) ANS 192, ANS 313B, ANS 314, ANS 315 or approval of department.
Management practices and systems for beef herds. Emphasis on feed requirements, reproduction, breeding and nutrition, housing, diseases, costs and returns. Field trips required.

432. Dairy Production and Management
Spring. 4(3-3) ANS 132, ANS 313B, ANS 314, ANS 315 or approval of department.
Management practices for dairy herds. Systems for milking, housing, nutrition and health. Economics and efficient use of resources. Field trip required.

433. Ruminant Nutrition
Winter. 4(3-2) ANS 313B or concurrently.
Principles of ruminant nutrition and application to actual feeding practices in commercial dairy and beef operations. Rumen fermentation as related to feed utilization, growth, milk production and milk composition.

434. Dairy Cattle Breeding
Spring. 4(2-4) ANS 314.
Applications of population genetics to improving dairy cattle. Use of selection, aids to selection, and systems of mating to formulate breeding plans. Inheritance of economic traits. Breed improvement programs.

435. Mammary Physiology
Fall. 4(3-2) PSL 241, BCH 200 or BCH 401. Interdepartmental with the Department of Physiology.

442. Horse Production and Management
Spring. 4(3-2) ANS 142, ANS 313B, ANS 314, ANS 315 or approval of department.
Management of stables and horse breeding farms. Pedigree and conformational selection, reproduction, promotion, marketing, economics, facilities, disease and parasite control, lameness and footcare. Field trip required.

454. Meat Animal Breeding
Spring. 3(2-2) ANS 314.
Uses and effects of different breeding systems with beef cattle, sheep, and swine. Formulating breeding plans.

455. Principles of Animal Reproduction
Winter. 4(5-0) PSL 241, BCH 200 or BCH 401. Interdepartmental with the Department of Physiology.
Processes of reproduction and endocrinology with special emphasis on anatomy of reproductive systems, folliculogenesis, gametogenesis, reproductive cycle, fertilization, sex determination, gestation and artificial regulation of these reproductive events for economic benefit.

456. Meat Science and Muscle Biology
Winter. 4(4-0) BCH 200, PSL 240.
Structure, composition and function of muscle, its characteristics and growth and fattening. Properties of fresh and processed meat, microbiology, preservation, palatability, inspection and sanitation, by-products, nutritive value.

462. Poultry Production and Management
Spring of even-numbered years. 4(3-2) ANS 182, ANS 313B, ANS 314, ANS 315 or approval of department.
Practical application of economic and management principles to commercial poultry enterprises. Field trips required.

463. Poultry Nutrition
Winter of odd-numbered years. 4(3-2) ANS 313B or concurrently.

464. Poultry Breeding and Incubation
Winter of even-numbered years. 4(3-2) ANS 314.
Genetic and biological factors affecting economic characteristics including egg production, egg size, hatchability, growth and viability and factors involved in the hatching of eggs.

465. Avian Physiology
Spring. 4(3-3) Approval of department. Interdepartmental with the Department of Physiology.
Systemic physiology of birds emphasizing respiration, circulation, temperature regulation, the endocuries, and reproduction.

469. Avian Diseases and Health
Winter of even-numbered years. 4(3-2) MPH 200 or B S 212 or approval of department.
Microbiological concepts; causes, preventive and therapeutic methods for poultry diseases, laboratory diagnosis and experiments.

472. Sheep Production and Management
Winter of odd-numbered years. 4(3-2) ANS 152, ANS 313B, ANS 314, ANS 315 or approval of department.
Management of sheep enterprises. Emphasis on selection, reproduction, nutrition, health, housing, marketing and economics. Field trips required.

482. Swine Production and Management
Fall. 4(3-2) ANS 152, ANS 313B, ANS 314, ANS 315 or approval of department.
Historical aspects and current trends of breed, breeding selection, nutritional requirements, management practices, marketing, housing, and environmental needs, disease and parasite control. Field trips required.

483. Swine Nutrition
Spring of odd-numbered years. 3(3-0) ANS 313B; ANS 482.
Digestive and metabolic development and nutritional requirements of swine. Interactions of genetics, disease, endocrinology and environment with nutrition. Critical evaluation of swine feeds and feed formulation. Recent swine nutrition research.

498. Animal Systems in International Development
Spring. 4(4-0) Juniors, ANS 211 or approval of department.
511. Animal Science for Veterinarians
Fall, 4(4-0) First year Veterinary Medicine students.
Husbandry and management of food animals, horses, companion animals, zoo animals and laboratory animals.

512. Physical Examination and Animal Handling II
Spring, 2(0-6) First year Veterinary Medicine students.
Techniques for restraint and examination of cattle, sheep, goats, and swine. Inspections of production units.

525. Animal Nutrition
Spring, 5(4-2) BCH 401.

800. Advanced Independent Study
(A H 890.) Fall, Winter, Spring, Summer. 1 to 4 credits. May be repeated for a maximum of 8 credits. Approval of department.
Investigation of areas within animal science of special interest to graduate students.

830. Rumen and Gastrointestinal Microbiology
Fall of even-numbered years. 3 credits.
MH 303, BCH 452 or approval of department.
Microbial activities in the rumen and gastrointestinal ecosystems of major livestock species. Microbial types, classification, distribution, degradation and fermentation of substrates, interactions, manipulation and cultivation.

832. Research Methods in Nutrition
(A H 827.) Winter of odd-numbered years. 2(2-0) Approval of department.
Experimental techniques in nutrition: ration formulation, animal management, sampling procedures, balance trials, bioassays, tracer methodology, determination of nutrient requirements.

871. Design of Animal Experiments
(S14.) Spring, 4(4-0) STT 423.
Choice, implementation and statistical analysis of experimental plans for research with animals. Designs for reduction of experimental error. Analysis of experiments with complex structure or unequal subclass numbers.

872. Analysis of Unbalanced Multifactor Data
(S15.) Spring, 4(4-0) STT 423.
Applied analysis techniques of field or survey data in biological sciences with unbalanced subclass numbers. Building models to fit data and research goals. Interpretation of analysis.

873. Statistical Packages for Analysis of Experiments
Fall, 3(2-2) STT 423 or approval of instructor.
Recording data for computer analysis. Computer files and the EDITOR. Methods include SPSS, SAS, BMDP and GENSTAT.

899. Master's Thesis Research
(A H 899.) Fall, Winter, Spring, Summer. Variable credit. Approval of department.

931. Advanced Ruminant Nutrition
(DRY 925.) Fall of even-numbered years. 4(4-0) PSL 811, ANS 830, approval of department.
Biochemistry, physiology, and microbiology of ruminant digestion. Absorption and metabolism of rumin fermentation products.

935. Comparative Nutrition—Lipids and Carbohydrates
(HNF 928.) Winter of odd-numbered years. 4(0-0) BCH 452 and a previous course on principles of nutrition. Interdepartmental with administered by Human Nutrition and Foods.
Regulatory aspects of carbohydrate and lipid metabolism as influenced by nutrition in mammals. Emphasis on normal and abnormal physiological states such as obesity, ketosis and diabetes.

936. Comparative Nutrition—Protein Metabolism and Developmental Biology
(HNF 927.) Winter of even-numbered years. 4(0-0) PSL 811, or approval of department. Interdepartmental with Human Nutrition and Foods.
Protein quality assessment, protein status, protein calorie malnutrition, amino acid metabolism, protein turnover, absorption, hormonal control of protein metabolism, developmental aspects of protein metabolism and growth.

937. Comparative Nutrition—Minerals
(A H 928.) Fall of even-numbered years. 3 credits. PSL 811 or approval of department.
Interdepartmental with Human Nutrition and Foods.
Forms and location in body, metabolic roles, deficiency and toxicity signs, interrelationships, requirements and biological availability of sources.

941. Genetics of Breed Improvement
(A H 923.) Winter of odd-numbered years. 3(3-0) ANS 314, STT 421. Breed improvement. Changing gene frequency. Genetic and environmental subdivision of phenotypic variance.

942. Breeding Systems and Plans
(A H 942.) Spring of odd-numbered years. 3(3-0) ANS 941.
Biometric relations between related animals. Role of selection in changing populations. The effects of different mating systems.

943. Biometrical Genetics
(956.) Fall, 4(4-0) ANS 872.

999. Doctoral Dissertation Research
(A H 999.) Fall, Winter, Spring, Summer. Variable credit. Approval of department.