820. Advanced Neurorany: Structure and Function of Cells of CNS
Spring. 3 credits. ANT 815 and approval of instructor.
Correlated anatomy and physiology of CNS cells and their processes including current concepts and principles of cytology, ultrastructure, development and plasticity, axonal transport mechanisms, electrical properties and functional connections.

865. Advanced Neurobiology
Spring. 4(4-0) BFY 827.
Interdepartmental with the departments of Biophysics, Physiology, Psychology, and Zoology.
Basic organization, structure and function of neural networks comprising sensory, motor, and autonomic systems including examples from invertebrates and vertebrates. Attendance at neuroscience seminar is required.

891. Concepts in Tumorigenesis
Winter of even-numbered years. 2(2-0)
Approval of instructor.
To depth evaluation of the current concepts in tumorigenesis emphasizing the experimental results from which these concepts evolved.

899. Master's Thesis Research
Fall. Winter. Spring. Summer.
Variable credits. Majors.

999. Doctoral Dissertation Research
Fall. Winter. Spring. Summer.
Variable credit. Majors.

ANIMAL HUSBANDRY - A H

College of Agriculture and Natural Resources

111. Livestock and Meat Industry
Fall. Spring 4(3-4)
Livestock utilization of renewable resources in producing products for man. Adaptation, economics of production and management systems of beef cattle, swine, sheep and horse enterprises. Evaluation of market livestock.

214. Introduction to Horses and Horsemanship
Fall. 3(3-1)
The horse industry in today's society. Relationship of form to function. Selection, breeding, feeding, foot care, health, and management of the pleasure horse. Proper horsemanship methods.

235. Live Animal and Carcass Evaluation and Selection
Fall. 3(3-4) A H 111 or concurrently.
Evaluation of feeding stock, market animals, and carcasses. Emphasis on production records and soundness of breeding animals, quality grading, yield, dressing and pricing market animals and carcasses.

242. 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 grades and cuts of beef, pork, lamb and poultry products.

245. Meat Evaluation and Grading
Fall. Winter. 1 to 3 credits. May reenroll for a maximum of 4 credits subject to a maximum of 10 credits in A H 245 and A H 335 combined. A H 235.
Evaluation of beef, pork, and lamb carcasses and wholesale cuts according to industry and consumer demands and federal grading regulations. Numerous field trips to meat packing operations.

335. Livestock Selection
Fall. Winter. Spring. 1 to 3 credits. May reenroll for a maximum of 9 credits subject to a maximum of 10 credits in A H 245 and A H 335 combined. A H 235.
Evaluation of productive merit of individual animals. Comparison of type with a standard. Relationship of form to function. Field trips to prominent livestock breeding establishments and to major livestock events.

341. Principles of Meat Science
(241.) Winter. 3(3-0) BCH 200, PSL 240.
Structure, composition and function of muscle, its conversion to meat; animal growth and fattening, properties of fresh and processed meat, microbiology, preservation, palatability, inspection and sanitation, by-products, nutritive value.

344. Meat Science Laboratory
(244.) Winter. 2(2-0) A H 341 or concurrently.
Exercises in meat animal slaughter, meat cutting, wholesale and retail cut identification, processing, inspection, quality control and merchandizing.

415. Special Problems
Fall. Winter. Spring. Summer. 1 to 2 credits. May reenroll for a maximum of 8 credits. Approval of department.
Special problems in: animal breeding, ruminaat nutrition, nonruminant nutrition, management, meat science, or reproduction.

426. Swine Nutrition
Spring of odd-numbered years. 3(3-0) A H 451, A NS 325 or A NS 325.
Digestive and metabolic development and nutrient requirements of swine. Interactions of genetica, disease, endocrinology and environment with nutrition. Critical evaluation of swine feeds and feed formulation. Recent swine nutrition research.

431. Swine Production
Fall. 4(3-2) A NS 325 or approval of department.
Historical aspects with emphasis on current trends. Breeds, breeding, selection, nutrition requirements, management practices, marketing, housing and environmental needs, disease and parasite problems. Visits to representative farms.

452. Sheep Production
Winter. 4(3-2) A NS 325 or approval of department.
Management of sheep enterprises. Using the tools of selection, reproduction, nutrition, flock health, housing and marketing to increase returns. Practice in trimming, showing, and management skills.

453. Beef Production
Fall. Spring. 4(3-2) A NS 325 or approval of department.
Feeding, breeding, management, marketing. Emphasis on growth and development; costs and returns; feed requirements; reproduction, crossbreeding, performance testing, housing, diseases. Practice in management skills.

ANIMAL HUSBANDRY - Descriptions of Courses

462. Meat Animal Breeding
Spring. 2(2-2) A NS 361.
Uses and effects of different breeding systems with beef cattle, sheep, and swine. Formulating breeding plans.

1DC. The Impact of Animal Resource Management Upon the World's Developing Nations
Fall. For course description, see Interdisciplinary Courses.

827. Research Methods in Nutrition
Fall. 2(2-0) Approval of department.
Experimental techniques in nutrition: ration formulation, animal management, sampling procedures. Summer of even-numbered years. May reenroll for a maximum of 8 credits. Approval of department.
Investigation of animal husbandry areas of special interest to individual graduate students.

899. Master's Thesis Research
Fall. Winter. Spring. Summer.
Variable credit. Approval of department.

912. Seminar
Fall, Winter, Spring. 1 credit.

921. Pathology of Nutritional and Metabolic Diseases
Summer of odd-numbered years. 4(3-2)
Approval of department; PTH 404 or ANT 420 A NS 325, BCH 452, HNF 462 recommended. Interdepartmental with Human Nutrition and Foods and the departments of Large Animal Surgery, and Medicine, and Pathology. Administered by Human Nutrition and Foods.
Development, physiopathology and morphologic pathology of nutritional and metabolic diseases including carbohydrate, protein, fatty acid, vitamin and mineral deficiencies, their experimental induction and their medical or economic significance.

926. Comparative Nutrition-Lipids and Carbohydrates
Winter of odd-numbered years. 4(4-0)
BCH 452 and a previous course on principles of nutrition. Interdepartmental with and 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.

927. Comparative Nutrition-Protein Metabolism and Developmental Biology
Winter of even-numbered years. 4(4-0)
BCH 452, PSL 802 or concurrently. Interdepartmental with and administered by Human Nutrition and Foods.
Protein quality assessment, protein status, protein calorie malnutrition, amino acid metabolism, protein turnover, digestion and absorption, hormonal control of protein metabolism, developmental aspects of protein metabolism and growth.
928. **Comparative Nutrition-Minerals**

Spring of even-numbered years. 3 credits. BCH 452; PSL 302. Interdepartmental with Human Nutrition and Foods. Forms and location in body, metabolic roles, deficiency and toxicity signs, interrelationships, requirements and biological availability of sources.

929. **Comparative Nutrition-Vitamins**

Spring of odd-numbered years. 3(3-0) BCH 452 and a previous course on principles of nutrition. Interdepartmental with Human Nutrition and Foods. Chemical and physical properties, standards of activity, occurrence, metabolic roles, antivitamins, deficiency and toxicity signs, requirements and factors affecting requirements.

963. **Genetics of Breed Improvement**

Winter of odd-numbered years. 3(3-0) ANS 361, STT 421. Breed improvement. Changing gene frequency. Genetic and environmental subdivision of phenotypic variance.

964. **Breeding Systems and Plans**

Spring of odd-numbered years. 3(3-0) A H 963. Biometric relations between related animals. Role of selection in changing populations. The effects of different mating systems.

999. **Doctoral Dissertation Research**

Fall, Winter, Spring, Summer. Variable credit. Approval of department.

**Animal Science ANS**

**College of Agriculture and Natural Resources**

101. **Animal Science**

Fall. 3(4-2)

Survey of the animal industries including history, economic geography, anatomy and physiology, nutrition, and feed usage, and systems of commercial livestock and poultry production.

213. **Animal Science Seminar**

Fall. 1(2-0)

Animal science industries. Industry representatives will be utilized to discuss particular areas.

325. **Principles of Animal Nutrition**

Spring. 5(5-0) CEM 132; BCH 200 recommended. Livestock feeds and their nutrients. Functions of and requirements for nutrients. Evaluation of feeds. Feeding practices. Formulation of rations for beef and dairy cattle, horses, poultry, sheep and swine.

361. **Principles of Animal Breeding**

(461.) Winter. 3(3-0) B S 211 or a course in Mendelian genetics. Quantitative genetics. Gene frequency. Statistical tools used in animal breeding. Effect of selection and mating systems on animal population.

433. **Ruminant Nutrition**

(DRY 431.) Winter. 4(3-2) ANS 325. Interdepartmental with and administered by the Department of Dairy Science. 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.

450. **Toxicology of Food Producing Animals**

Spring. 4(4-0) PSL 240, BCH 200. Interdepartmental with the Department of Dairy Science. Fate and effects of toxic chemicals in food-producing animals' impact on animal production, residues in food products, safety assessment and control methods.

525. **Animal Nutrition**


826. **Animal Nutrition**

Spring. 4(4-0) One course each: biochemistry, physiology, and approval of department. Nutrition toxic to animal feeding. Application of chemistry and physiology to nutrition. Nutrient requirements for normal body functions. Techniques involved in nutrition research; readings in current literature.

854. **Design of Animal Experiments**

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.

855. **Analysis of Unbalanced Multifactor Data**

Spring. 4(4-0) STT 423. Applied analysis techniques of field or survey data with unbalanced subclass numbers in field of biological sciences; predictions utilizing several variables; estimation of effects of factors and their interactions.

965. **Biometrical Genetics**

Fall of odd-numbered years. 4(4-0) ANS 855 and one course in quantitative genetics. Genetics of human beings. Quantitative traits: estimation of components of variance; correlation of relatives. Selection Index theory; multi-factor and multivariate responses in designed experiments.

171. **Introduction to Sociocultural Anthropology (S)**

Fall, Winter, Spring, Summer. 4(3-1) Comparison of ways of life among primitive, peasant and civilized peoples. Implications of these styles of life for understanding of human behavior in general and exotic cultures in particular.

1DC. **Resource Ecology and Man**

For course description, see Interdisciplinary Courses.

1DC. **Introduction to Latin America**

For course description, see Interdisciplinary Courses.

221. **Introduction to Social and Cultural Analysis**

Fall, Spring. 4(3-1) ANP 171. Basic theoretical framework of socio-cultural analysis: structural functionalism, evolutionism, and cultural ecology.

250. **Culture, Environment and Adaptation (S)**

Fall. 4(3-1) Culture as an adaptive process— as developed in the million years of human history and modern societies.

1DC. **Continuing Revolution in China: Problems and Approaches**

For course description, see Interdisciplinary Courses.

262. **Status of Women in Culture and Society: A Comparative View**

Spring. 4(3-1) Comparative analysis of the status of women emphasizing non-Western cultures. Economic and domestic division of labor between the sexes as a factor underlying division of status, power and authority.

263. **Origin of Civilization: Archaeology**

Winter. 4(4-0) The rise, development and spread of culture in the period before written history. Archaeological evidence is used to trace the evolution of culture as it has been reconstructed from the excavation of prehistoric sites in the Old and New World.

264. **Great Discoveries in Archaeology**

Winter. 4(4-0) Great discoveries in archaeology that have captured the public's imagination and shaped the discipline, from Olumo Gorge to King Tut's tomb.

265. **Vanished Peoples and Lost Civilizations**

Fall, Spring. 4(4-0) Concepts of cultural evolution and origins of civilization as found in popular literature ranging from Atlantis to Chariots of the Gods.

266. **War and Aggression**

Fall, Spring. 3(3-0) The question "What makes friends and what makes enemies?" is examined from the standpoint of cultural anthropology. Violence-prone cultures and peaceful ones are compared for factors influencing human aggression.