820. Research Methods in Agricultural Engineering
Fall. 1(1-0)

Discussion of procedures for initiating, developing, carrying out, and completing research projects.

822. Seminar
Spring. 1(1-0)

840. Advanced Power and Machinery
Spring. 3(2-2) 495, 496

Analysis of agricultural machine components and systems. Emphasis on hydraulic power transmission, controls, and management of machinery systems.

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

990. Advanced Topics in Agricultural Engineering
Fall, Winter, Spring. 3(3-0) May re-enroll for a maximum of 9 credits. Approval of department.

New developments in agricultural engineering. Subjects to be covered include atmospheric turbulence, optimization of agricultural systems, measurement systems, food engineering, and agricultural rheology.

991. Soil Dynamics
Winter. 3(2-3) Approval of department.


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

AGRICULTURE

College of Agriculture and Natural Resources

456. United States Agriculture for Overseas Students
Fall. 3(3-0) Advanced undergraduate or graduate students from countries other than the United States or Canada.


482. World Agriculture and Economic Development
Fall. Summer of even-numbered years. 3(3-0) AEC 240 or EC 201. Interdepartmental with and administered by the Agricultural Economics Department.

Food and agricultural problems of the world. Role of agriculture in the process of economic development. Relationships of agricultural trade patterns, farming systems and economic growth.

892. Agriculture Administration
Winter. 3(3-0) AEC 482 or approval of department.

Administrative relationships and principles involved in agricultural development in the world's emerging countries. Case studies used to illustrate the process of change in institutions that serve agricultural economies in transition.

803. Approaches to Accelerated Development
Spring. 3(3-6) 802 or approval of department.

Examination of trained manpower needs and project priorities in agricultural and natural resource sectors. Alternative methods for organizing research and development. Case studies of national planning.

AMERICAN STUDIES

AMS

College of Arts and Letters

301. Issues in American Civilization
Fall, Winter, Spring. 3(3-0) May re-enroll for a maximum of 9 credits. ATM 313.

Not applicable to major requirements.

410. Perspectives in American Studies
Fall. 3 credits. Juniors in American Studies or approval of American Studies Committee.

Methods and significant works, for majors in the American Studies program. Offered by members of the relevant departments.

411. Problems in American Civilization
Winter, Spring. 3 credits. Majors must re-enroll for a maximum of 6 credits. 410; Juniors in American Studies or approval of American Studies Committee.

Seminar approach to selected problems in American life employing the objectives and approaches of interdisciplinary study. Offered by members of relevant departments, for majors in the American Studies program.

ANATOMY

ANT

College of Human Medicine

College of Veterinary Medicine

316. General Anatomy
Fall, Spring. 5(5-0) N S 193.

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.

401. Undergraduate Seminar
Fall, Winter, Spring. 1 credit.

413. Problems in Anatomy
Fall, Winter, Spring, Summer. 1 to 2 credits. May re-enroll for a maximum of 6 credits. Approval of department.

Additional study in one or more of the various fields of anatomy such as gross anatomy, histology, and embryology.

420. Microscopic Anatomy and Embryology
(365A) Fall. 5(2-8) Medical Technology students or approval of department.

Course 420 devoted to microscopic structure of cells and tissues and beginning embryology; 421 to structure of organs and systems and completion of embryology.

421. Microscopic Anatomy and Embryology
(365B) Winter. 3(2-8). 490

Continuation of 420.

521. Gross and Microscopic Anatomy
Fall, Winter. 3(3-6) First-term Veterinary Medicine students, approval of department for graduate students.

Gross anatomy of a representative animal, the dog, is studied. Cytoology, embryology, comparative histology, neuroanatomy, and organography are combined with dissection, demonstration and practical applications to give complete coverage.

522. Gross and Microscopic Anatomy
Winter, Summer. 3(3-0) 321

Continuation of 521.
533. Anatomy of Areas of Surgical and Clinical Importance in Domestick Animals
Fall, Winter, Summer. 8(3-14) Sixth-term Veterinary Medicine students.
Lectures, dissection of fresh material and the study of sections, models, radiographs and reprints related to areas of surgical and clinical importance in domestic animals.

540. Gross Biomedical Structure
Fall, Winter, Spring. Variable credits.
May re-enroll for a maximum of 15 credits.
Human Medicine students; approval of department for graduate students.
Human structure, systemic and regional, is studied in self-instructional and dissection sequences. Application of this knowledge to various organs as they appear under the light and electron microscope.

541. Meat Production
(Fall) Winter. 4(2-6) 111.

542. Meats, Poultry and Fishery Products I
Fall. 3(3-2) Interdepartmental with and administered by the Food Science Department.
Principles of evaluation and nutritive value. Identification of grades and cuts of beef, pork, lamb and poultry products.

543. Microscopic Anatomy
Fall. 5(3-5) Human Medicine students; approval of department for graduate students.
The normal structure of cells, tissues and organs as they appear under the light and electron microscope.

801. Seminar
Fall, Winter, Spring. 1(1-0) Approval of department.

811. Problems in Anatomy
Fall, Winter, Summer. 4(3-4) Variable credit.
May re-enroll for a maximum of 15 credits. Basic disciplines in various areas and approval of department.

815. Anatomy of the Nervous System
(Fall) Spring. 5(3-5) Approval of department.
Developmental, gross and microscopic anatomy of the nervous system. Organizational and functional aspects of the peripheral and central nervous system are stressed. Gross demonstrations include brain and dog dissections.

899. Research
Fall, Winter, Spring. Variable credit. Majors.

901. Seminar
Fall, Winter, Spring. 1(1-0) Approval of department.

902. Comparative Histology
Fall of even-numbered years. 5 credits. Approval of department.
Comparative histology of digestive, respiratory, urinary, and integumentary systems of domestic and laboratory animals.

903. Comparative Histology
Winter of odd-numbered years. 5 credits. 902 or approval of department.
Continuation of 902 to include the muscular, skeletal, circulatory, male and female reproductive systems, placentaion, and endocrine organs.

999. Research
Fall, Winter, Spring. Variable credit. Majors.

ANIMAL HUSBANDRY A H
College of Agriculture and Natural Resources

111. Livestock and Meat Industry
Fall. 4(3-4)
Adaptation, distribution and numbers of livestock throughout the world, significance and economic importance. Trends in livestock production. Evaluation, breeding, classifying and marketing of livestock and meat. Relationship of live animal conformation to carcass merit.

241. Meat Production
(Fall) Winter. 4(2-6) 111.

242. Meats, Poultry and Fishery Products I
Fall. 3(3-2) Interdepartmental with and administered by the Food Science Department.
Principles of evaluation and nutritive value. Identification of grades and cuts of beef, pork, lamb and poultry products.

245. Meat Evaluation and Grading
Fall, Spring. 1 to 3 credits. May re-enroll for a maximum of 6 credits. 241.
Evaluation of carcasses and wholesales cuts of beef, pork, veal and lamb in accordance with federal and commercial grading standards. Inspection trips through large meat packing plants.

335. Livestock Selection
Fall, Winter, Spring. 1 to 3 credits.
May re-enroll for a maximum of 8 credits. 111.
Evaluation of productive merit of individual animals. Computation of type within standard. Relationship of factor to function. Field trips to prominent livestock breeding establishments and to major livestock events.

415. Special Problems
Fall, Winter, Spring. 1 to 3 credits.
May re-enroll for a maximum of 5 credits.
Seniors and approval of department.
Special studies in fields not covered by other animal husbandry courses.

451. Swine Production
Spring. 4(3-3) ANS 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 of even-numbered years. 4(2-3) ANS 335 or approval of department.
History, modern breeds, breeding, selection, nutrition and feeding, management, marketing, housing, diseases and parasites. Visits to farm flocks. Practice in management skills.

453. Beef Production
Spring. 4(3-3) ANS 325 or approval of department.
History, breeds, breeding, selection, nutrition and feeding, commercial systems of production, diseases and parasites. Visits to purbred herds and to feed lots. Practice in management skills.

454. Horse Production
Fall of even-numbered years. 3(2-2) ANS 325 or approval of department.
Selection, breeding, feeding, management, marketing, diseases and parasites. Relationship of body structure to performance.

462. Meat Animal Breeding
Spring. 3(2-2) ANS 461.
Uses and effects of different breeding systems with beef cattle, sheep, and swine. Formulating breeding plans.

485. Techniques in Nutrition Research
Winter of odd-numbered years. 1 to 3 credits. CEM 335; approval of department.
Interdepartmental with the Foods and Nutrition Department.
Use of specialized instruments and techniques. Laboratory safety. Management of laboratory animals. Development of abilities in areas of particular interest to individual students.

486. Advanced Special Problems
Fall, Winter, Spring. Summer. 1 to 4 credits. May re-enroll for a maximum of 8 credits. Approval of department.
Investigation of animal husbandry areas of special interest to individual graduate students.

999. Research
Fall, Winter, Spring. Variable credit. Approval of department.

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

927. Comparative Nutrition I
Winter. 2 or 4 credits. BCH 402; PSL 503 or concurrently. Interdepartmental with and administered by the Foods and Nutrition Department.
Mammalian nutrition based on biochemical and physiological phenomena. Proteins are studied in the first half of the term; carbohydrates, fats and macro-minerals in the last half.

928. Comparative Nutrition II
Spring. 2 or 4 credits. BCH 402, PSL 503. Interdepartmental with the Foods and Nutrition Department.
Mammalian nutrition based on biochemical and physiological phenomena. Micro-nutrients are studied in the first half of the term; vitamins in the last half.

963. Genetics of Breed Improvement
Winter. 3(0-0) ANS 461, STT 421.

964. Breeding Systems and Plans
Spring. 3(3-0) 963.
Biometric relations between related animals. Role of selection in changing populations. The effects of different mating systems.

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