891. Concepts in Tumorigenesis
Winter of even-numbered years. 2(2-0)
Approval of instructor.
In 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
See Animal Science:

ANIMAL SCIENCE

College of Agriculture and Natural Resources

Animal Husbandry  A H

111. Livestock and Meat Industry
Fall, Spring. 4(3-4)
LIVESTOCK UTILIZATION OF WASHABLE 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(2-1)
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. Livestock and Meat Industry Evaluation and Selection
Fall. 3(1-4) A H 111 or concurrently.
Evaluation of breeding stock, market animals, and carcasses. Emphasis on production records and soundness of breeding animals, quality grading, yield grading and pricing market animals and carcasses.

242. Meats, Poultry and Fishery Products I
Fall. 3(2-3) 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.
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 335.
Evaluation of productive merit of individual animals. Comparison of types 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(0-5) 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 3 credits. May reenroll for a maximum of 8 credits. Approval of department.
Special problems in: animal breeding, ruminant nutrition, nonruminant nutrition, man­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­­…
### Courses

1. **Dairy Science**
   - **Doctoral Dissertation Research**
     - Fall, Winter, Spring, Summer. Variable credit. Approval of department.

2. **Dairy Career Alternatives**
   - Fall. 1(1-0). Credits earned in this course are included in computation of GPA and MAPS but are not included in the 180 credits required for graduation.
   - Career and employment options for dairy majors including research, education, farming, agribusiness, government, and financial, including self-instructional unit on career planning.

3. **Dairy Production**
   - Fall, Spring. 4(3-2)

4. **Dairy Physiology and Management**
   - Fall. 4(3-2) B S 210 or B S 211; DRY
   - 1005 or approval of department.
   - Basic reproductive and lactational physiology; management practices for maximum reproductive performance and maximum production of high quality milk.

5. **Dairy Herdman Techniques**
   - Winter. 2(0-4) DRY 214, majors only.
   - Herd health and management procedures, disease prevention and detection, equipment maintenance and record systems for dairy herds.

6. **Dairy Cattle Judging**
   - Spring. 4(4-0) DRY 250.
   - Dairy herd management practices, dairy record systems, housing, milking, reproduction and feeding systems. Economic and efficient usage of inputs.

7. **Dairy Cattle Breeding**
   - Spring. 3(0-6)
   - Desired type in dairy cattle. Judging and show ring procedures. Competitive judging. Teams selected to represent Michigan State University in national competition.

8. **Seminar**
   - Spring. 1(1-0) Juniors.
   - Major issues pertinent to the dairy industry are described by authorities from MSU and the dairy industry of Michigan. Students are provided an opportunity for an exchange in ideas.

9. **Ruminant Nutrition**
   - Winter. 4(3-2) ANS 325. Interdepartmental with Animal 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.

10. **Mammary Physiology**
    - Winter. 4(3-2) PSL 240, BCH 200. Interdepartmental and administered jointly with the Department of Physiology.

11. **Endocrinology and Reproductive Physiology**
    - Fall. 4(5-0) PSL 240. Interdepartmental and administered jointly 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.

12. **Toxicology of Food Producing Animals**
    - Spring. 4(4-0) PSL 240, BCH 200. Interdepartmental with and administered by Animal Science.
    - Fate and effects of toxic chemicals in food-producing animals: impact on animal production, residues in food products, safety assessment and control methods.

13. **Special Problems**
    - Fall, Winter, Spring. Variable credit. May reenroll for a maximum of 10 credits. Approval of department.

14. **Topics in Dairy Science**
    - Fall, Winter, Spring. Variable credit. May reenroll for credit. Approval of department.
    - Topics from breeding, management, nutrition, or physiology, changing from term to term to include recent technical advances.

15. **Master's Thesis Research**
    - Fall, Winter, Spring. Variable credit. Approval of department.

16. **Advanced Ruminant Nutrition**
    - Fall of even-numbered years. 4(4-0) BCH 452, PSL 801 or approval of department.
    - Microbiology, physiology and biochemistry of ruminant digestion and the absorption and metabolism of rumin fermentation products.

17. **Physiology of Mammalian Reproduction**
    - Winter of odd-numbered years. 4(5-0) DRY 445 or PSL 445 or approval of department. Interdepartmental with the Department of Physiology.

18. **Doctoral Dissertation Research**
    - Fall, Winter, Spring, Summer. Variable credit. Approval of department.

### Poultry Science

19. **Poultry Science and Practice**
    - Winter, Spring. 4(3-2)
    - Poultry in the agricultural economy, fundamental principles of anatomy, physiology and body systems; diseases, their prevention and control; management practices and procedures in producing poultry meat and eggs.

20. **Special Problems**
    - Fall, Winter, Spring, Summer. Variable credit. May reenroll for a maximum of 6 credits. Approval of department.
    - Studies in any of the following: avian genetics, management, nutrition, physiology, other areas of poultry science.

21. **Asian Nutrition**
    - Fall. 4(3-3) ANS 325.

22. **Poultry Breeding and Incubation**
    - Winter of even-numbered years. 4(3-2)
    - ANS 361.
    - Genetic and biological factors affecting economic characteristics including egg production, egg size, hatchability, growth and viability and factors involved in the hatching of eggs.

23. **Poultry Industry--Marketing and Management**
    - Spring of even-numbered years. 5(4-2)
    - PS 224 or approval of department.
    - Practical application of economic and management principles to commercial poultry enterprises. Field trips required.

24. **Asian Physiology**
    - Spring. 4(3-3) Approval of department. Interdepartmental and administered jointly with the Department of Physiology.
    - Systemic physiology of birds emphasizing respiration, circulation, temperature regulation, the endocrine, and reproduction.

25. **Asian Disease Prevention and Treatment**
    - 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.

26. **Advanced Poultry--Special Problems**
    - Fall, Winter, Spring, Summer. Variable credit. Approval of department.
    - Studies in any of the following: avian genetics, management, nutrition, physiology, other areas of poultry science.

27. **Master's Thesis Research**
    - Fall, Winter, Spring, Summer. Variable credit. Approval of department.

28. **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.


361. Principles of Animal Breeding  (461) Winter 3(3-0) B S 211 or a course in Mendelian genetics.

433. Ruminant Nutrition  Winter 4(3-2) ANS 325, Interdepartmental with and administered by Dairy Science.
Principles of ruminant nutrition and applications 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 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  Fall 5(4-2) BCH 401.

586. Animal Nutrition  Spring 4(4-0) One course each: biochemistry, physiology, and approval of department. Nutrition basic 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 models for quantitative traits: estimation of components of variance; correlation of relatives; Selection Index theory; multivariate and multivariable responses in designed experiments.

ANTHROPOLOGY  ANP

College of Human Medicine
College of Osteopathic Medicine
College of Social Science

100. The Origin of Man and Culture  Fall, Winter, Spring, Summer 4(3-1)
Introduction to physical anthropology; the position of man in the animal kingdom, the genetic mechanisms of evolution, human beginnings and the fossil record, racial evolution and racial types among modern man, the anticipation of culture among other animals and the development of human culture, and culture as an adaptive mechanism.

171. Introduction to Sociocultural Anthropology (5)  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.

IDC. Introduction to Latin America I  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 (5)  Fall 4(3-1)
Culture as an adaptive process—as developed in the million years of human history and still influencing environmental quality, population control, and allocation of resources in primitive and modern societies.

IDC. Introduction to Contemporary China  For course description, see Interdisciplinary Courses.

262. Status of Women in Culture and Society: A Comparative View  Fall 3(3-0)
Comparative analysis of the status of women emphasizing non-Western cultures and societies. 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 development 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 Olduvai 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.

275. The Anthropology of Asia  Fall 4(4-0)
Several cultural complexes and culture types—from hunting and gathering through complex civilization—of East, Southeast, and South Asia. The cultures and nature of their development will be examined. Past and present significance of cultural stability and change will be seen in a comparative framework.

281. The Africans and Their Cultures  Spring 4(4-0)
Racial and cultural problems confronting the African peoples.

Interwoven nature of cultural traditions in the modern world. Consideration of how people of developing nations respond to the dominant cultural forces of industrialized nations.

IDC. Contemporary South Asia  For course description, see Interdisciplinary Courses.

343. Introduction to Physical Anthropology  Fall 4(3-2)
Problems, data and techniques associated with the main topical areas of physical anthropology: human genetics, hominid evolution, primate behavior, human osteology and human diversity. Field trips may be required.