### ANIMAL SCIENCE — ANS

#### College of Agriculture and Natural Resources

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Schedule</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>110</td>
<td>Introductory Animal Science</td>
<td>Fall</td>
<td>3-0</td>
</tr>
<tr>
<td>132</td>
<td>Dairy Production Laboratory</td>
<td>Spring</td>
<td>3-0</td>
</tr>
<tr>
<td>152</td>
<td>Livestock Production Laboratory</td>
<td>Spring</td>
<td>3-0</td>
</tr>
<tr>
<td>162</td>
<td>Poultry Production Laboratory</td>
<td>Winter</td>
<td>3-0</td>
</tr>
<tr>
<td>217</td>
<td>Evaluation of Animal and Carcass</td>
<td>Fall</td>
<td>3-1</td>
</tr>
<tr>
<td>256</td>
<td>Meats, Poultry and Fishery Products</td>
<td>Fall</td>
<td>3-2</td>
</tr>
<tr>
<td>257A</td>
<td>Meat Evaluation and Grading</td>
<td>Winter</td>
<td>1-0</td>
</tr>
</tbody>
</table>

### ANIMAL SCIENCE — ANS

**ANIMAL SCIENCE — ANS**

**College of Agriculture and Natural Resources**

**110. Introductory Animal Science**
- **Fall: 3-0 credits**

**132. Dairy Production Laboratory**
- **Spring: 3-0 credits**
- Physical characteristics of cows and facilities. Anatomy: Experience in estrous detection, milking equipment, feeds and rations and records. Normal cow behavior.

**152. Livestock Production Laboratory**
- **Spring: 3-0 credits**
- Systems of meat and poultry evaluation, meat cuts, identification, merchandising, processing, storage and handling. Eggs and egg products.

**162. Poultry Production Laboratory**
- **Winter: 3-0 credits**

**217. Evaluation of Animal and Carcass**
- **Fall: 3-1 credits**
- 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.

**256. Meats, Poultry and Fishery Products I**
- **Fall: 3-2 credits**
- Principles of evaluation and nutritive value. Identification of grades and cuts of beef, pork, lamb and poultry products.

**257A. Meat Evaluation and Grading**
- **Winter: 1-0 credits**
- Students may not earn more than 10 credits from the following courses: ANS 257A, ANS 257B, 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: 1-0 credits**
- Students may not earn more than 10 credits from the following courses: ANS 257A, ANS 257B, 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: 2-0 credits**
- Juniors, ANS 110 or concurrently.
- Current production and policy issues in animal science.

**313A. Principles of Animal Nutrition**
- **Fall: 4-4 credits**
- BCH 401 or BCH 407.
- Requirements for and metabolism of nutrients. Feeding practices and diets for beef and dairy cattle, horses, poultry and swine.

**313B. Feeds and Diet Formulation**
- **Winter: 2-1 credits**
- 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: 3-0 credits**
- B S 211 or a course in Mendelian genetics.

**315. Principles of Farm Animal Physiology**
- **Spring: 4-3 credits**
- ANS 211, PSL 241.
- Anatomy and physiology emphasizing endocrine integration for homestasis and homeostasis. Regulatory interaction among growth, lactation and reproduction during different productive states of farm animals.

**316. Merchandising Purebred Livestock**
- **Spring: 2-1 credits**
- ANS 213, ANS 142, or ANS 155; or approval of department.
- Purebred livestock industry structure. Methods of merchandising breeding livestock including private treaty and auction sales. Advertising, sale selection, and budgeting of a purebred livestock sale.

**337. Judging Dairy Cattle**
- **Spring: 3-0 credits**
- Students may not earn more than 10 credits from the following courses: ANS 257A, ANS 257B, ANS 357A, ANS 357B, ANS 357C.
- Desired type in dairy cattle. Judging and showing procedures. Competitive judging. Teams selected to represent Michigan State University in national competition.

**347A. Judging Horses**
- **Spring: 2-0 credits**
- Students may not earn more than 10 credits from the following courses: ANS 257A, ANS 257B, ANS 347A, ANS 347B, ANS 357A, ANS 357B, ANS 357C.
- Evaluation of conformation. Productive and functional merits of individual horses. Field trips to prominent equine establishments and events required.
A-20

Descriptions — Animal Science

Courses

347B. Judging Horses
Fall. 1(0-6) ANS 347A. Students may earn no more than 10 credits from the following courses: ANS 257A, ANS 257B, ANS 337, ANS 347A, ANS 347B, ANS 357A, ANS 357B, ANS 357C. Course to be completed in the first half of the quarter. Evaluation of conformation. Productive and functional merits of individual horses. Field trips to prominent equine establishments and events required.

357A. Judging Livestock
Winter. 1 to 3 credits. ANS 217 or approval of department. 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 conformation of cattle, pigs and sheep. Productive and functional merits of individual food animals. Field trips to prominent livestock establishments required.

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 337, 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 337, 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 12 credits. Students are limited to a combined total of 12 credits. ANS 400 and ANS 490. Approval of department. Independent study in genetics, nutrition, physiology, toxicology, meat science, 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 200. Fate and effects of toxic chemicals in food-producing animals: impact on animal productivity, residues in food products, safety assessment and control methods.

415. Animal Reproduction Laboratory

416. Growth Biology of Meat Animals
Spring of even-numbered years. 3(0-3) 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

422. Beef Production and Management
Spring. 4(3-2) ANS 152, ANS 313B, ANS 314, ANS 315 or approval of department. Management practices and systems for beef herds. Emphasis on feed requirements, reproduction, breeding, performance testing, housing, diseases, costs and returns. Field trips required.

432. Dairy Production and Management

433. Ruminant Nutrition
Winter. 4(3-2) ANS 312B 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(3-4) 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

442. Horse Production and Management
Spring. 4(3-2) ANS 149, ANS 313B, ANS 314, ANS 315 or approval of department. Management of horses and horse breeding farms. Pedigree and conformational selection, reproduction, promotion, marketing, economics, facilities, diseases 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 determinations, 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, conversion to meat, animal growth and fattening. Properties of fresh and processed meat, microbiology, preservation, palatability, inspection and sanitation, by-products, nutritional 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

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 endocrine, and reproduction.

469. Avian Diseases and Health
Winter of even-numbered years. 4(2-2) 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 breeds, 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.
Dietary and metabolic development and nutrient requirements of swine. Interactions of genetics, disease, endocrinology and environment with nutrition. Critical evaluation of swine feeds and feed formulation. Recent swine nutrition research.

488. Animal Systems in International Development
Spring, 4(4-0) Juniors, ANS 211 or approval of department.

490. Senior Thesis in Animal Science
Fall, Winter, Spring. 3 credits. May reenroll for a maximum of 12 credits. May reenroll for a maximum of 12 credits in ANS 400 and ANS 490. Senior Animal Science Majors, approval of department. Not open to graduate students.
Individual study of selected topic and preparation of a senior thesis.

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
(AH 990.) Fall, Winter, Spring. Summer. 1 to 6 credits. May reenroll 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 Microbiota
Fall of odd-numbered years. 3(3-0) MPH 305, BCH 452 or approval of department.
Microbial activities in the ruminant 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
(AH 827.) Winter of odd-numbered years. 2(3-0) Approval of department.
Experimental techniques in nutrition: ration formulation, animal management, sampling procedures, animal trials, bioassays, tracer methodology, determination of nutrient requirements.

871. Design of Animal Experiments
(854.) Spring, 4(4-0) STT 421.
Choice, implementation and statistical analysis of experimental plans for research with animals. Design for resolution of experimental error. Analysis of experiments with complex structure or unequal subclass numbers.

872. Analysis of Unbalanced Multifactor Data
(855.) Spring, 4(4-0) STT 422.
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.

938. Comparative Nutrition-Vitamins
(AH 929.) Spring of odd-numbered years. 3(3-0) BCH 452 and a previous course on principles of nutrition. Interdepartmental with and administered by Human Nutrition and Foods.
Chemical and physical properties, standards of activity, occurrence, metabolic roles, antinutritional factors affecting requirements.

941. Genetics of Breed Improvement
(AH 963.) Winter of odd-numbered years. 3(3-0) ANS 314, STT 421.

942. Breeding Systems and Plans
(AH 964.) 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
(965.) Fall. 4(4-0) ANS 872.

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

ANTHROPOLOGY

College of Human Medicine
College of Social Science

100. Human Evolution
Fall, Winter, Spring. 4(4-0)
Scientific fossil and archaeological evidence on human cultural and biological origins; anticipations of culture in other animals; place of humans among the primates; processes of organic evolution; modern human genetic variability; culture as an adaptive mechanism; cultural development to the dawn of civilization.

171. Introduction to Sociocultural Anthropology
(S)
Fall, Winter, Spring. 4(4-0)
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.

210. The Anthropological Film
Winter. 3(2-2)
Ethnographic film as a preserver of vanishing cultures worldwide, as a tool for ethnological analysis and as a creator of perspectives about other cultures and cultural variability.

221. Social and Cultural Analysis
Fall, Spring. 4(4-0) ANP 171 or approval of department.
Basic theoretical framework of socio-cultural analysis: structural functionalism, evolutionism, and cultural ecology.