

ANIMAL SCIENCE (ANS)

College of Agricultural & Environmental Sciences

ANS 001 – Domestic Animals & People (4 units)

Course Description: Animal domestication and factors affecting their characteristics and distribution. Animal use for food, fiber, work, drugs, research and recreation; present and future roles in society. Laboratory exercises with beef and dairy cattle, poultry, sheep, swine, laboratory animals, fish, horses, meat and dairy products.

Learning Activities: Lecture 3 hour(s), Laboratory 3 hour(s).

Enrollment Restriction(s): Pass One restricted to lower division students majoring in Agricultural & Environmental Education (AAEE), Animal Science & Management (AANM), Animal Science (AANS), or Sustainable Agriculture & Food Systems (ASAF).

Grade Mode: Letter.

General Education: Science & Engineering (SE).

ANS 002 – Introductory Animal Science (4 units)

Course Description: Growth, reproduction, lactation, inheritance, nutrition, and disease control in domesticated animals and species used in aquaculture; the application of sciences to animal production.

Prerequisite(s): ANS 001 and BIS 002A recommended.

Learning Activities: Lecture 3 hour(s), Laboratory 3 hour(s).

Enrollment Restriction(s): Open to students in Animal Science, Animal Science and Management, Agricultural and Environmental Education, and Sustainable Agriculture and Food Systems majors.

Grade Mode: Letter.

General Education: Science & Engineering (SE); Scientific Literacy (SL); Visual Literacy (VL); Writing Experience (WE).

ANS 012 – Animal Science: Basic Principles & Application (3 units)

Course Description: Overview of domestic and global animal industries. Exploration of production systems, animal biology, genetics, anatomy, physiology, reproduction, health, behavior, research, biotechnology and welfare.

Learning Activities: Lecture 3 hour(s).

Grade Mode: Letter.

General Education: Science & Engineering (SE).

ANS 015 – Introductory Horse Husbandry (3 units)

Course Description: Introduction to care and use of light horses emphasizing the basic principles for selection of horses, responsibilities of ownership, recreational use and raising of foals.

Learning Activities: Lecture 3 hour(s).

Grade Mode: Letter.

General Education: Science & Engineering (SE); Quantitative Literacy (QL); Visual Literacy (VL).

ANS 017 – Canine Behavior: Learning & Cognition (3 units)

Course Description: Domestic dog behavior from basic principles of learning to complex cognitive behaviors; interaction between learning and cognition including how these processes contribute to interactions with humans; basic genetic correlates of learning and cognition.

Learning Activities: Lecture 3 hour(s).

Grade Mode: Letter.

ANS 018 – Introductory Aquaculture (4 units)

Course Description: Historical and contemporary aquacultural practices. Interaction between the aqueous culture environment and the biology of aquatic animals. Impact of economics and governmental policies on the development of aquaculture. Interaction of aquacultural practices with larger societal goals.

Learning Activities: Lecture 3 hour(s), Discussion 1 hour(s).

Grade Mode: Letter.

General Education: Science & Engineering (SE); Oral Skills (OL); Quantitative Literacy (QL); Scientific Literacy (SL); Visual Literacy (VL); Writing Experience (WE).

ANS 021 – Livestock & Dairy Cattle Judging (2 units)

Course Description: Evaluation of type as presently applied to light horses, meat animals and dairy cattle. Relationship between form and function, form and carcass quality, and form and milk production.

Prerequisite(s): ANS 001 or ANS 002 recommended.

Learning Activities: Laboratory 6 hour(s).

Grade Mode: Letter.

General Education: Science & Engineering (SE); Oral Skills (OL).

ANS 022A – Animal Evaluation (2 units)

Course Description: Attendance at 3 one-day weekend field trips required. Domestic livestock species with emphasis on visual appraisal, carcass evaluation, and application of performance information. Emphasis on accurate written and oral descriptions of evaluations. Prerequisite to intercollegiate judging competition.

Prerequisite(s): ANS 021; or equivalent.

Learning Activities: Laboratory 3 hour(s), Fieldwork 30 hour(s).

Grade Mode: Pass/No Pass only.

General Education: Science & Engineering (SE); Oral Skills (OL).

ANS 022B – Animal Evaluation (2 units)

Course Description: Attendance at three one-day weekend field trips required. Continuation of ANS 022A with emphasis on specific species: swine, beef cattle and sheep. Application of animal science principles to selection and management problem-solving scenarios. Prerequisite to intercollegiate judging competition.

Prerequisite(s): ANS 022A; or equivalent.

Learning Activities: Laboratory 3 hour(s), Fieldwork 30 hour(s).

Grade Mode: Pass/No Pass only.

General Education: Science & Engineering (SE); Oral Skills (OL).

ANS 041 – Domestic Animal Production (2 units)

Course Description: Principles of farm animal management, including dairy and beef cattle, sheep, and swine. Industry trends, care and management, nutrition, and reproduction.

Learning Activities: Lecture 2 hour(s).

Grade Mode: Letter.

General Education: Science & Engineering (SE).

ANS 041L – Domestic Animal Production Laboratory (2 units)

Course Description: Animal production principles and practices, including five field trips to dairy cattle, beef cattle, sheep, and swine operations and campus labs.

Prerequisite(s): ANS 041 (can be concurrent).

Learning Activities: Discussion 1 hour(s), Laboratory 3 hour(s).

Grade Mode: Pass/No Pass only.

General Education: Science & Engineering (SE); Scientific Literacy (SL); Visual Literacy (VL); Writing Experience (WE).

ANS 042 – Introductory Companion Animal Biology (4 units)

Course Description: Companion animal domestication. Historical, contemporary perspectives. Legislation concerning companion animals. Selected topics in anatomy, physiology, genetics, nutrition, behavior and management. Scientific methods in studying the human-animal bond. Discussions: application of biological concepts to problems related to companion animals.

Learning Activities: Lecture 3 hour(s), Discussion 1 hour(s).

Grade Mode: Letter.

General Education: Science & Engineering (SE); Quantitative Literacy (QL); Scientific Literacy (SL); Writing Experience (WE).

ANS 049A – Animal Management Practices: Aquaculture (2 units)

Course Description: Application of the principles of elementary biology to the management of a specific animal species. Up to four different topics may be taken.

Learning Activities: Discussion 1 hour(s), Laboratory 3 hour(s).

Grade Mode: Pass/No Pass only.

ANS 049B – Animal Management Practices: Beef (2 units)

Course Description: Application of the principles of elementary biology to the management of a specific animal species. Up to four different topics may be taken.

Learning Activities: Discussion 1 hour(s), Laboratory 3 hour(s).

Grade Mode: Pass/No Pass only.

ANS 049C – Animal Management Practices: Dairy (2 units)

Course Description: Application of the principles of elementary biology to the management of a specific animal species. Up to four different topics may be taken.

Learning Activities: Discussion 1 hour(s), Laboratory 3 hour(s).

Grade Mode: Pass/No Pass only.

ANS 049D – Animal Management Practices: Goats (2 units)

Course Description: Application of the principles of elementary biology to the management of a specific animal species. Up to four different topics may be taken.

Learning Activities: Discussion 1 hour(s), Laboratory 3 hour(s).

Grade Mode: Pass/No Pass only.

ANS 049E – Animal Management Practices: Horses (2 units)

Course Description: Application of the principles of elementary biology to the management of a specific animal species. Up to four different topics may be taken.

Learning Activities: Discussion 1 hour(s), Laboratory 3 hour(s).

Grade Mode: Pass/No Pass only.

ANS 049F – Animal Management Practices: Laboratory Animals (2 units)

Course Description: Application of the principles of elementary biology to the management of a specific animal species. Up to four different topics may be taken.

Learning Activities: Discussion 1 hour(s), Laboratory 3 hour(s).

Grade Mode: Pass/No Pass only.

ANS 049G – Animal Management Practices: Meats (2 units)

Course Description: Application of the principles of elementary biology to the management of a specific animal species. Up to four different topics may be taken.

Learning Activities: Discussion 1 hour(s), Laboratory 3 hour(s).

Grade Mode: Pass/No Pass only.

ANS 049H – Animal Management Practices: Poultry (2 units)

Course Description: Application of the principles of elementary biology to the management of a specific animal species. Up to four different topics may be taken.

Learning Activities: Discussion 1 hour(s), Laboratory 3 hour(s).

Grade Mode: Pass/No Pass only.

ANS 049I – Animal Management Practices: Sheep (2 units)

Course Description: Application of the principles of elementary biology to the management of a specific animal species. Up to four different topics may be taken.

Learning Activities: Discussion 1 hour(s), Laboratory 3 hour(s).

Grade Mode: Pass/No Pass only.

ANS 049J – Animal Management Practices: Swine (2 units)

Course Description: Application of the principles of elementary biology to the management of a specific animal species. Up to four different topics may be taken.

Learning Activities: Discussion 1 hour(s), Laboratory 3 hour(s).

Grade Mode: Pass/No Pass only.

ANS 049K – Animal Management Practices: Captive & Companion Avian (2 units)

Course Description: Application of the principles of elementary biology to the management of a specific animal species. Up to four different topics may be taken.

Learning Activities: Discussion 1 hour(s), Laboratory 3 hour(s).

Grade Mode: Pass/No Pass only.

ANS 090C – Research Group Conference (1 unit)

Course Description: Weekly conference on research problems, progress and techniques in the animal sciences.

Prerequisite(s): Consent of instructor.

Learning Activities: Discussion 1 hour(s).

Enrollment Restriction(s): Restricted to lower division standing.

Repeat Credit: May be repeated.

Grade Mode: Pass/No Pass only.

ANS 092 – Internship in Animal Science (1-12 units)

Course Description: Internship off and on campus in dairy, livestock, and aquaculture production, research and management; or in a business, industry, or agency associated with these or other animal enterprises. All requirements of Internship Approval form must be met.

Prerequisite(s): Consent of instructor.

Learning Activities: Internship 3-18 hour(s).

Enrollment Restriction(s): Restricted to lower division standing.

Grade Mode: Pass/No Pass only.

ANS 092D – Internship in Animal Science Discussion (1 unit)

Course Description: Provides opportunities to meet and discuss with staff and/or faculty the biological concepts that are the basis for the care and management programs used with animals during their lower division internship.

Prerequisite(s): ANS 092 (can be concurrent); consent of instructor.

Learning Activities: Discussion 1 hour(s).

Enrollment Restriction(s): Open to students with lower division standing only; must be concurrently enrolled in the corresponding ANS 092.

Repeat Credit: May be repeated for credit up to 6 unit(s); repeat credit is allowed when corresponding to different ANS 092 internships.

Grade Mode: Passed/Not Passed only.

ANS 098 – Directed Group Study (1-5 units)

Course Description: Directed group study.

Prerequisite(s): Consent of instructor.

Learning Activities: Variable 3-15 hour(s).

Enrollment Restriction(s): Restricted to lower division standing.

Grade Mode: Pass/No Pass only.

ANS 099 – Special Study for Undergraduates (1-5 units)

Course Description: Special study for undergraduates.

Prerequisite(s): Consent of instructor.

Learning Activities: Variable.

Enrollment Restriction(s): Restricted to lower division standing.

Grade Mode: Pass/No Pass only.

ANS 100 – Animal Physiology (5 units)

Course Description: Basic principles of animal physiology in domesticated and captive animals with a comparative approach. Molecular, biochemical, chemical and physical aspects and their influences on function of physiological systems in animals.

Prerequisite(s): BIS 002A; CHE 002B.

Learning Activities: Lecture 4 hour(s), Discussion 1 hour(s).

Enrollment Restriction(s): Pass One restricted to students in the Animal Science and Animal Science and Management majors.

Credit Limitation(s): Not open for credit to students who have taken NPB 101.

Grade Mode: Letter.

General Education: Science & Engineering (SE).

ANS 103 – Animal Welfare (4 units)

Course Description: Application of principles of animal behavior and physiology to assessment and improvement of the welfare of wild, captive, and domestic animals. Topics include animal pain, stress, cognition, motivation, emotions, and preferences, as well as environmental enrichment methods.

Prerequisite(s): ANS 104 or NPB 102 or WFC 141; or consent of instructor.

Learning Activities: Lecture 2 hour(s), Discussion 2 hour(s).

Enrollment Restriction(s): Restricted to upper division standing.

Grade Mode: Letter.

General Education: Science & Engineering (SE); Scientific Literacy (SL).

ANS 104 – Principles & Applications of Domestic Animal Behavior (4 units)

Course Description: Basic principles of animal behavior as applied to domesticated species. Emphasis placed on application of the principles of animal behavior.

Prerequisite(s): ANS 002 or BIS 002B.

Learning Activities: Lecture 3 hour(s), Discussion 1 hour(s).

Enrollment Restriction(s): Pass One open to Animal Science majors only.

Grade Mode: Letter.

General Education: Science & Engineering (SE).

ANS 106 – Domestic Animal Behavior Laboratory (3 units)

Course Description: Research experience with the behavior of large domestic animals. Experimental design, methods of data collection & analysis, and reporting of experimental results.

Prerequisite(s): ANS 104 or NPB 102; or consent of instructor.

Learning Activities: Laboratory 6 hour(s), Discussion 1 hour(s).

Enrollment Restriction(s): Pass One restricted to Animal Science (AANS) majors in Senior standing.

Grade Mode: Letter.

General Education: Science & Engineering (SE); Quantitative Literacy (QL); Scientific Literacy (SL); Writing Experience (WE).

ANS 107 – Zoo Biology & Research (3 units)

Course Description: Introduction to the modern zoo, including history, staffing structure, aspects of animal care such as housing, social management, and enrichment, research in genetics, health, nutrition, behavior, cognition, and guest perceptions. Requires a visit to the Sacramento Zoo and development of a project research proposal based on a specific exhibit at the zoo.

Prerequisite(s): BIS 002B.

Learning Activities: Lecture/Discussion 5 hour(s).

Grade Mode: Letter.

General Education: Science & Engineering (SE).

ANS 108 – Equine Behavior & Welfare (3 units)

Course Description: Improve the understanding and application of good welfare practices when managing, training, transporting, treating, or breeding equine. Recognize changes in behavior or causes related to compromised health or welfare.

Learning Activities: Lecture 3 hour(s).

Grade Mode: Letter.

ANS 112 – Sustainable Animal Agriculture (3 units)

Course Description: Current applications of sustainable animal agriculture including the challenges of animal production, animal needs, animal well-being, and protection of the environment and resources for future food supply systems. Various scenarios for meeting sustainability objectives are evaluated using computing modeling.

Prerequisite(s): BIS 002B or ANS 001; STA 100 or PLS 120 recommended.

Learning Activities: Lecture/Discussion 3 hour(s).

Grade Mode: Letter.

General Education: Science & Engineering (SE) or Social Sciences (SS); Oral Skills (OL); Quantitative Literacy (QL).

ANS 113 – Meat Safety & Hazard Analysis & Critical Control Points (2 units)

Course Description: Fundamentals of meat safety and Hazard Analysis Critical Control Points (HACCP). Principles, development, implementation of HACCP. Control of physical, chemical, biological hazards assuring meat/food safety via programs (Good Manufacturing Practices, Sanitation Standard Operating Procedures), hazard analysis critical control points. Regulations, focusing on HACCP implementation in meat & seafood products. Value, shortcomings of sampling, and microbial testing in meat safety assurance programs.

Prerequisite(s): ANS 002 or consent of instructor.

Learning Activities: Lecture/Discussion 1 hour(s), Laboratory 3 hour(s).

Grade Mode: Letter.

General Education: Science & Engineering (SE).

ANS 115 – Advanced Horse Production (4 units)

Course Description: Feeding, breeding, and management of horses; application of the basic principles of animal science to problems of production of all types of horses. Designed for students who wish to become professionally involved in the horse industry.

Prerequisite(s): ANS 015; BIS 101; NUT 115; (ANS 100 or NPB 101); or consent of instructor.

Learning Activities: Lecture 3 hour(s), Laboratory 3 hour(s).

Grade Mode: Letter.

General Education: Science & Engineering (SE); Quantitative Literacy (QL); Scientific Literacy (SL); Writing Experience (WE).

ANS 118 – Fish Production (4 units)

Course Description: Current practices in fish production; relationship between the biological aspects of a species and the production systems, husbandry, management, and marketing practices utilized. Emphasis on species currently reared in California.

Prerequisite(s): WFC 120.

Learning Activities: Lecture 3 hour(s), Discussion 1 hour(s).

Grade Mode: Letter.

General Education: Science & Engineering (SE).

ANS 119 – Invertebrate Aquaculture (4 units)

Course Description: Management, breeding and feeding of aquatic invertebrates; application of basic principles of physiology, reproduction, and nutrition to production of mollusks and crustaceans for human food; emphasis on interaction of species biology and managerial techniques on production efficiencies.

Prerequisite(s): BIS 002B.

Learning Activities: Lecture 3 hour(s), Discussion 1 hour(s).

Grade Mode: Letter.

General Education: Science & Engineering (SE).

ANS 120 – Principles of Meat Science (3 units)

Course Description: Anatomical, physiological, developmental, and biochemical aspects of muscle underlying the conversion of muscle to meat. Includes meat processing, preservation, microbiology, and public health issues associated with meat products.

Prerequisite(s): ANS 002.

Learning Activities: Lecture 3 hour(s).

Enrollment Restriction(s): Restricted to upper division standing.

Grade Mode: Letter.

General Education: Science & Engineering (SE).

ANS 120L – Meat Science Laboratory (2 units)

Course Description: Laboratory exercises and student participation in transformation of live animal to carcass and meat, structural and biochemical changes related to meat quality, chemical and sensory evaluation of meat, and field trips to packing plant and processing plant.

Prerequisite(s): ANS 002; ANS 120 (can be concurrent).

Learning Activities: Discussion 1 hour(s), Laboratory 3 hour(s).

Enrollment Restriction(s): Restricted to upper division standing.

Grade Mode: Letter.

General Education: Science & Engineering (SE).

ANS 123 – Animal Growth & Development (4 units)

Course Description: Growth and development of animals from conception to maturity, viewed from practical and biological perspectives; includes genetic, metabolic, nutritional control of cell and organism function.

Prerequisite(s): (ABI 103 or BIS 103); (ANS 100 or NPB 101).

Learning Activities: Lecture 3 hour(s), Lecture/Discussion 1 hour(s).

Grade Mode: Letter.

General Education: Science & Engineering (SE); Visual Literacy (VL).

ANS 124 – Lactation (4 units)

Course Description: Biochemical, genetic, physiological, nutritional, and structural factors relating to mammary gland development, the initiation of lactation, the composition of milk and lactational performance.

Prerequisite(s): (NPB 101 or ANS 100); (ABI 103 (can be concurrent) or BIS 103 (can be concurrent)).

Learning Activities: Lecture 3 hour(s), Laboratory 2 hour(s).

Enrollment Restriction(s): Pass One restricted to Animal Science (AANS) students in senior standing only.

Grade Mode: Letter.

General Education: Science & Engineering (SE); Scientific Literacy (SL).

ANS 125 – Equine Exercise Physiology (3 units)

Course Description: Basic and applied physiology of the exercising horse. Includes physiological systems, gait analysis, lameness, pharmacology, sports medicine; sport horse performance evaluation and conditioning.

Prerequisite(s): (NPB 101 or ANS 100); ANS 015.

Learning Activities: Lecture 3 hour(s).

Grade Mode: Letter.

General Education: Science & Engineering (SE).

ANS 126 – Equine Nutrition (3 units)

Course Description: Equine digestion, digestive physiology, diet development and evaluation, and the relationship of the topics to recommended feeding practices and nutritional portfolios.

Prerequisite(s): ANS 015; NUT 115.

Learning Activities: Lecture 3 hour(s).

Grade Mode: Letter.

General Education: Science & Engineering (SE).

ANS 127 – Advanced Equine Reproduction (3 units)

Course Description: Reproductive physiology, anatomy and endocrinology of the mare and stallion. Emphasis on structure/function relationships as they are applied to improving equine reproductive management and efficiency.

Prerequisite(s): ANS 115; (ANS 100 or NPB 101).

Learning Activities: Lecture 3 hour(s).

Grade Mode: Letter.

General Education: Science & Engineering (SE); Writing Experience (WE).

ANS 128 – Agricultural Applications of Linear Programming (4 units)

Course Description: Applications of linear programming in agriculture, emphasizing resource allocation problems and decision making. Problems include crop production, ration formulation, and farm management. Hands-on experience in developing linear programs and interpreting the results.

Prerequisite(s): (PLS 021 or PLS 021V) or ECS 015; or consent of instructor.

Learning Activities: Lecture 2 hour(s), Laboratory 2 hour(s), Discussion 1 hour(s).

Enrollment Restriction(s): Restricted to upper division standing.

Grade Mode: Letter.

General Education: Science & Engineering (SE); Quantitative Literacy (QL); Scientific Literacy (SL).

ANS 129 – Environmental Stewardship in Animal Production Systems (3 units)

Course Description: Management principles of environmental stewardship for grazing lands, animal feeding, operations and aquaculture operations; existing regulations, sample analyses, interpretation and utilization of data, evaluation of alternative practices, and policy development.

Prerequisite(s): (BIS 010 or (BIS 002A, BIS 002B)), CHE 002A, CHE 002B, (CHE 008A, CHE 008B) or (CHE 118A, CHE 118B); and consent of instructor.

Learning Activities: Lecture 3 hour(s).

Grade Mode: Letter.

General Education: Science & Engineering (SE); Scientific Literacy (SL).

ANS 130 – Endocrinology Laboratory (3 units)

Course Description: Experimental approaches used in animal endocrinology research. Introductions to a variety of topics to help assimilate many ideas from physiology courses, experimental approaches, and skills reading and interpreting scientific papers.

Prerequisite(s): ANS 100 or NPB 101.

Learning Activities: Lecture 1 hour(s), Laboratory 6 hour(s).

Enrollment Restriction(s): Pass One restricted to Animal Science (AANS) majors in Senior standing.

Grade Mode: Letter.

ANS 131 – Reproduction & Early Development in Aquatic Animals (4 units)

Course Description: Physiological and developmental functions related to reproduction, breeding efficiency and fertility of animals commonly used in aquaculture.

Prerequisite(s): MCB 150; WFC 120; or consent of instructor.

Learning Activities: Lecture 3 hour(s), Laboratory 3 hour(s).

Grade Mode: Letter.

General Education: Science & Engineering (SE).

ANS 132 – Microbiology of Animal Systems Laboratory (3 units)

Course Description: Basic microbiology techniques and the ability to produce recombinant proteins from genomic information. Importance of carbohydrate degrading enzymes in animal systems. Animal systems of interest range from the digestive tract of animals (e.g. rumen) to animal waste (e.g. manure).

Prerequisite(s): (BIS 002A or BIS 002B); (CHE 008B or CHE 118B).

Learning Activities: Laboratory 6 hour(s), Discussion 1 hour(s).

Enrollment Restriction(s): Pass One restricted to Animal Science majors in Senior standing.

Grade Mode: Letter.

ANS 133 – Animal Cell Culture Laboratory (4 units)

Course Description: Design, conduct, analyze, and present a research project involving cell culture.

Prerequisite(s): ABI 102; ABI 103; (ANS 100 or NPB 101); or consent of instructor.

Learning Activities: Lecture 2 hour(s), Laboratory 6 hour(s).

Enrollment Restriction(s): Pass One restricted to Animal Science (AANS) majors in Senior standing.

Grade Mode: Letter.

ANS 134 – Animal Nutrition Laboratory (3 units)

Course Description: Animal nutrition research experience for senior-level students. Forming a valid hypothesis, designing treatments, preparing for experiments, recording measurements in the field, summarizing results. Emphasis on developing essential research skills & proper techniques for collecting, summarizing, and presenting data.

Prerequisite(s): ABI 103 (can be concurrent); (ANS 100 (can be concurrent) or NPB 101 (can be concurrent)); (STA 100 or PLS 120).

Learning Activities: Lecture/Discussion 1 hour(s), Laboratory 3 hour(s), Project.

Enrollment Restriction(s): Pass One restricted to Animal Science (AANS) majors in Senior standing.

Grade Mode: Letter.

ANS 135 – Production Animal Laboratory (3 units)

Course Description: Biochemical methods for developing and conducting research with production animals, and interpreting and presenting data. Laboratory focus course which uses sheep as model. There may be one or two mandatory all day Saturday field trips.

Prerequisite(s): ABI 102; ABI 103; (NPB 101 or ANS 100).

Learning Activities: Lecture/Discussion 1 hour(s), Laboratory 3 hour(s), Fieldwork.

Enrollment Restriction(s): Pass One restricted to Animal Science majors in senior standing.

Grade Mode: Letter.

General Education: Science & Engineering (SE).

ANS 136 – Techniques & Practices of Fish Culture (3 units)

Course Description: Daily care and maintenance of fish in residential aquariums, research and commercial facilities. Biological and environmental factors important to sound management of fish. Laboratories focus on fish culture including growth trials and biochemical assays.

Prerequisite(s): ANS 002; BIS 002A; BIS 002B; BIS 002C; ((CHE 008A, CHE 008B) or (CHE 118A, CHE 118B)).

Learning Activities: Lecture 1 hour(s), Laboratory 6 hour(s).

Enrollment Restriction(s): Pass One restricted to Animal Science majors in Senior standing.

Credit Limitation(s): Not open for credit to students who have previously completed ANS 136A or ANS 137.

Grade Mode: Letter.

General Education: Science & Engineering (SE); Quantitative Literacy (QL); Scientific Literacy (SL); Visual Literacy (VL); Writing Experience (WE).

ANS 137 – Techniques & Practices of Avian Culture (3 units)

Course Description: Daily care and maintenance of birds for research, commercial production and companion or hobby uses. Biological and environmental factors important to sound management of birds. Laboratories focus on bird husbandry, management and care and include growth trials and biochemical assays.

Prerequisite(s): ANS 002; BIS 002A; BIS 002B; BIS 002C; ((CHE 008A, CHE 008B) or (CHE 118A, CHE 118B)).

Learning Activities: Lecture 1 hour(s), Laboratory 6 hour(s).

Enrollment Restriction(s): Pass One restricted to Animal Science majors in senior standing.

Credit Limitation(s): Not open for credit to students who have previously completed ANS 136B or ANS 137.

Grade Mode: Letter.

General Education: Science & Engineering (SE); Quantitative Literacy (QL); Scientific Literacy (SL); Visual Literacy (VL); Writing Experience (WE).

ANS 138 – Meat Quality & Safety Laboratory (3 units)

Course Description: Advanced hands-on experience with meat and food related research. Development of laboratory skills in chemistry, biochemistry, microbiology, and meat science.

Prerequisite(s): CHE 002B; ANS 120 recommended.

Learning Activities: Lecture 1 hour(s), Laboratory 6 hour(s).

Enrollment Restriction(s): Pass One restricted to Animal Science majors with Senior standing.

Grade Mode: Letter.

ANS 139 – Experimental Animal Physiology (3 units)

Course Description: Combination of theory and hands-on experiences in animal physiology using various experimental techniques. Practical laboratory skill development from cellular level to whole animal, in areas such as genetics, endocrinology, histology and physiological function.

Prerequisite(s): ABI 102; BIS 101; or consent of instructor.

Learning Activities: Lecture 1 hour(s), Laboratory 3 hour(s), Fieldwork 3 hour(s).

Enrollment Restriction(s): Pass One restricted to Animal Science majors in senior standing.

Grade Mode: Letter.

General Education: Science & Engineering (SE); Writing Experience (WE).

ANS 140 – Management of Laboratory Animals (4 units)

Course Description: Laboratory animal management procedures in view of animal physiology, health and welfare, government regulations, and experimental needs. Clinical techniques using rodents and rabbits as models.

Prerequisite(s): NPB 101 or ANS 100.

Learning Activities: Lecture 3 hour(s), Laboratory 3 hour(s).

Grade Mode: Letter.

General Education: Science & Engineering (SE).

ANS 141 – Equine Enterprise Management (4 units)

Course Description: Examination of the concepts and principles involved in the operation of an equine enterprise. Essential aspects of equine enterprise management, including equine law, marketing, cash flow analysis, and impact of state and federal regulations.

Prerequisite(s): ANS 115; ECN 001A and ECN 001B recommended.

Learning Activities: Lecture/Discussion 4 hour(s).

Grade Mode: Letter.

General Education: Social Sciences (SS).

ANS 142 – Companion Animal Care & Management (4 units)

Course Description: Management and production of companion animals. Integration of the disciplinary principles of behavior, genetics, nutrition, and physiology as related to the care of companion animals.

Prerequisite(s): ANS 042; BIS 101; (NPB 101 or ANS 100); ((ABI 102 or BIS 102) and (ABI 103 or BIS 103)) recommended.

Learning Activities: Lecture 3 hour(s), Discussion 1 hour(s).

Enrollment Restriction(s): Pass One restricted to Animal Science or Animal Science & Management majors in senior standing.

Grade Mode: Letter.

General Education: Science & Engineering (SE); Oral Skills (OL);

Quantitative Literacy (QL); Scientific Literacy (SL); Visual Literacy (VL); Writing Experience (WE).

ANS 143 – Pig & Poultry Care & Management (4 units)

Course Description: Care and management of swine, broilers and turkeys as related to environmental physiology, nutrition and metabolism, disease management and reproduction. Saturday field trips.

Prerequisite(s): NUT 115; (NPB 101 or ANS 100); ANS 041; or consent of instructor.

Learning Activities: Lecture 3 hour(s), Laboratory 3 hour(s).

Grade Mode: Letter.

General Education: Science & Engineering (SE); Scientific Literacy (SL).

ANS 144 – Beef Cattle & Sheep Production (4 units)

Course Description: Genetics, physiology, nutrition, economics and business in beef cattle and sheep production. Resources used, species differences, range and feedlot operations. Emphasis on integration and information needed in methods for management of livestock enterprises. One or two Saturday field trips.

Prerequisite(s): ANS 041; NUT 115; or consent of instructor; ANG 107 recommended.

Learning Activities: Lecture 3 hour(s), Laboratory 3 hour(s), Fieldwork 2 hour(s).

Grade Mode: Letter.

General Education: Science & Engineering (SE); Oral Skills (OL);

Quantitative Literacy (QL); Scientific Literacy (SL); Visual Literacy (VL); Writing Experience (WE).

ANS 145 – Meat Processing & Marketing (4 units)

Course Description: Distribution, processing and marketing of meat and meat products. Meat and meat animal grading and pricing. Government regulations and social/consumer concerns. Future trends and impact on production management practices. Includes poultry.

Prerequisite(s): ANS 002; consent of instructor.

Learning Activities: Lecture 3 hour(s), Laboratory 3 hour(s).

Grade Mode: Letter.

General Education: Science & Engineering (SE).

ANS 146 – Dairy Cattle Production (5 units)

Course Description: Scientific principles from genetics, nutrition, physiology, and related fields applied to conversion of animal feed to human food through dairy animals. Management and economic decisions are related to animal biology considering the environment and animal well-being. Mandatory Saturday field-trip.

Prerequisite(s): NUT 115; or consent of instructor; ANG 107 recommended.

Learning Activities: Lecture 3 hour(s), Laboratory 3 hour(s), Fieldwork 1 hour(s), Discussion 1 hour(s).

Grade Mode: Letter.

General Education: Science & Engineering (SE); Oral Skills (OL); Quantitative Literacy (QL); Scientific Literacy (SL); Visual Literacy (VL); Writing Experience (WE).

ANS 147 – Dairy Processing & Marketing (3 units)

Course Description: Examination of distribution systems, processing practices, product quality, impact of government policy (domestic and foreign), marketing alternatives, and product development.

Prerequisite(s): ANS 002; or consent of instructor.

Learning Activities: Lecture 2 hour(s), Laboratory 3 hour(s).

Enrollment Restriction(s): Restricted to upper division standing.

Grade Mode: Letter.

General Education: Science & Engineering (SE).

ANS 148 – Enterprise Analysis in Animal Industries (4 units)

Course Description: Examination and application of decision making and problem solving in the production enterprise. Areas of production analysis, problem solving, risk analysis and cost-benefit analysis will be examined in terms of the total enterprise.

Prerequisite(s): Consent of instructor.

Learning Activities: Lecture/Discussion 4 hour(s).

Enrollment Restriction(s): Restricted to students with upper division standing.

Grade Mode: Letter.

General Education: Social Sciences (SS); Oral Skills (OL); Quantitative Literacy (QL); Writing Experience (WE).

ANS 149 – Farrier Science (3 units)

Course Description: In-depth examination of the structure-function relationship of the equine hoof and how it relates to conformation, injury and performance.

Prerequisite(s): ANS 115.

Learning Activities: Lecture 3 hour(s).

Grade Mode: Letter.

General Education: Science & Engineering (SE).

ANS 149L – Farrier Science Laboratory (1 unit)

Course Description: Art and science of horseshoeing in equine related fields. Proper use of the tools, materials and techniques in the fabrication of shoes and safe preparation of the hoof for application of shoes.

Prerequisite(s): ANS 149 (can be concurrent); or consent of instructor.

Learning Activities: Laboratory 3 hour(s).

Grade Mode: Pass/No Pass only.

ANS 150 – Animal Health & Disease (4 units)

Course Description: Basic concepts of animal immunology, microbiology, parasitology, epidemiology, vaccination, and how the knowledge can be used to improve animal health and prevent animal infection & disease. Includes relevant health and disease issues.

Prerequisite(s): ANS 002 or BIS 002B.

Learning Activities: Lecture 3 hour(s), Discussion 1 hour(s).

Grade Mode: Letter.

ANS 160A – Stress & Reproduction I (2 units)

Course Description: Evaluation of the impact of chronic stress on male reproductive development. Isolation stress tests on young animals. Data collection of treatment and control groups. Biological laboratory techniques and analysis. Two-quarter course.

Prerequisite(s): NPB 121 (can be concurrent); (ANS 104 (can be concurrent) or NPB 102 (can be concurrent)).

Learning Activities: Laboratory 3 hour(s), Project.

Enrollment Restriction(s): Pass One restricted to Animal Science majors in Senior standing.

Grade Mode: Letter.

ANS 160B – Stress & Reproduction II (2 units)

Course Description: Evaluation of the impact of chronic stress on male reproductive development. Isolation stress tests on young animals. Data collection of treatment and control groups. Biological laboratory techniques and analysis. Two-quarter course.

Prerequisite(s): ANS 160A.

Learning Activities: Laboratory 6 hour(s).

Grade Mode: Letter.

ANS 170 – Ethics of Animal Use (4 units)

Course Description: Ethical issues relating to animal use in contemporary society. Integration of philosophical theories with scientific evidence relating to animal behavior, mentality, and welfare. Uses of animals in agriculture, research, and as companions. Ethical responsibilities regarding wildlife and the environment.

Prerequisite(s): UWP 001 or UWP 001V or UWP 001Y or CMN 001 or COM 001 or COM 002 or COM 003 or COM 004 or ENL 003 or ENL 003V or NAS 005.

Learning Activities: Lecture 3 hour(s), Discussion 1 hour(s).

Enrollment Restriction(s): Pass One Open to Animal Science (AANS) majors with upper division standing only.

Grade Mode: Letter.

General Education: Social Sciences (SS); Scientific Literacy (SL); Writing Experience (WE).

ANS 190C – Research Group Conference (1 unit)

Course Description: Weekly conference on research problems, progress and techniques in the animal sciences.

Prerequisite(s): Consent of instructor; advanced standing.

Learning Activities: Discussion 1 hour(s).

Repeat Credit: May be repeated.

Grade Mode: Pass/No Pass only.

ANS 192 – Internship in Animal Science (1-12 units)

Course Description: Internship off and on campus in dairy, livestock and aquaculture production, research and management; or in a business, industry, or agency associated with these or other animal enterprises. All requirements of Internship Approval Form must be met.

Prerequisite(s): Consent of instructor; completion of 84 units.

Learning Activities: Internship 3-36 hour(s).

Grade Mode: Pass/No Pass only.

ANS 192D – Internship in Animal Science Discussion (1 unit)

Course Description: Weekly meeting with staff and/or faculty to discuss the biological concepts that are the basis for the care and management programs used with animals during their internship.

Prerequisite(s): ANS 192 (can be concurrent); consent of instructor.

Learning Activities: Discussion 1 hour(s).

Enrollment Restriction(s): Open to students with upper division standing only; must be enrolled concurrently in corresponding ANS 192.

Repeat Credit: May be repeated for credit up to 6 unit(s); repeat credit is allowed when corresponding to different ANS 192 internships.

Grade Mode: Passed/Not Passed only.

ANS 194 – Research in Animal Science (3 units)

Course Description: Research with a faculty mentor. Weekly discussion and laboratory on specific research topic. May include a seminar to research group. Choose from sections: (1) Animal Behavior; (2) Animal Genetics; (3) Animal Nutrition; (4) Animal Physiology.

Prerequisite(s): ANS 106 or ANS 135 or ANS 136 or ANS 137 or ANS 139 or ANG 111; or ANS 133; and consent of instructor.

Learning Activities: Laboratory 6 hour(s), Discussion 1 hour(s).

Repeat Credit: May be repeated 4 time(s).

Grade Mode: Letter.

ANS 194HA – Undergraduate Honors Thesis in Animal Science (4 units)

Course Description: Carry out a research project (chosen from faculty-suggested or approved proposals) during the academic year under the guidance of a faculty member. Upon completion, write a thesis and present a public seminar describing his/her research.

Prerequisite(s): (NPB 101 or ANS 100); (ABI 103 or BIS 103); and consent of instructor; minimum cumulative GPA of 3.200 and selection by the Honors Selection Committee.

Learning Activities: Lecture 1 hour(s), Laboratory 9 hour(s).

Grade Mode: Letter.

General Education: Science & Engineering (SE); Oral Skills (OL).

ANS 194HB – Undergraduate Honors Thesis in Animal Science (4 units)

Course Description: Carry out a research project (chosen from faculty-suggested or approved proposals) during the academic year under the guidance of a faculty member. Upon completion, write a thesis and present a public seminar describing his/her research.

Prerequisite(s): (NPB 101 or ANS 100); (ABI 103 or BIS 103); and consent of instructor; minimum cumulative GPA of 3.200 and selection by the Honors Selection Committee.

Learning Activities: Lecture 1 hour(s), Laboratory 9 hour(s).

Grade Mode: Letter.

General Education: Science & Engineering (SE); Visual Literacy (VL).

ANS 194HC – Undergraduate Honors Thesis in Animal Science (4 units)

Course Description: Carry out a research project (chosen from faculty-suggested or approved proposals) during the academic year under the guidance of a faculty member. Upon completion, write a thesis and present a public seminar describing his/her research.

Prerequisite(s): (NPB 101 or ANS 100); (ABI 103 or BIS 103); and consent of instructor; minimum cumulative GPA of 3.200 and selection by the Honors Selection Committee.

Learning Activities: Lecture 1 hour(s), Laboratory 9 hour(s).

Grade Mode: Letter.

General Education: Science & Engineering (SE); Writing Experience (WE).

ANS 197T – Tutoring in Animal Science (1-4 units)

Course Description: Tutoring of students in courses taught by instructors in the Department of Animal Science; weekly conference with instructor(s) in charge of the course; written critiques of teaching procedures; assist in preparation and development of instructional materials.

Prerequisite(s): Consent of instructor; animal Science or related major; upper division standing.

Learning Activities: Tutorial 3-6 hour(s).

Repeat Credit: May be repeated 6 unit(s).

Grade Mode: Pass/No Pass only.

ANS 198 – Directed Group Study (1-5 units)

Course Description: Selected topics relating to the animal sciences. May be taught abroad.

Prerequisite(s): Consent of instructor.

Learning Activities: Variable.

Grade Mode: Pass/No Pass only.

ANS 199 – Special Study for Advanced Undergraduates (1-5 units)

Course Description: Special study for advanced undergraduates.

Prerequisite(s): Consent of instructor.

Learning Activities: Variable.

Enrollment Restriction(s): Restricted to students with upper division standing.

Grade Mode: Pass/No Pass only.

ANS 200 – Strategies in Animal Production (4 units)

Course Description: Examines the forces and issues in animal agriculture through the strategic management process.

Prerequisite(s): Consent of instructor.

Learning Activities: Lecture/Discussion 4 hour(s).

Grade Mode: Letter.

ANS 206 – Models in Agriculture & Nutrition (3 units)

Course Description: Basic model building principles and techniques for statistical and systems simulation models. Optimization techniques for non-linear experimental designs and management models are presented. Quantitative analysis and evaluation of linear and non-linear equations used in agriculture and nutrition.

Prerequisite(s): MAT 016B; STA 108.

Learning Activities: Lecture 2 hour(s), Laboratory 3 hour(s).

Grade Mode: Letter.

ANS 259 – Literature in Animal Science (1 unit)

Course Description: Critical presentation and analysis of recent journal articles in animal science.

Prerequisite(s): Graduate standing.

Learning Activities: Seminar 1 hour(s).

Repeat Credit: May be repeated 9 time(s).

Grade Mode: Satisfactory/Unsatisfactory only.

ANS 290 – Seminar (1 unit)

Course Description: Reports and discussions of topics of interest in genetics, nutrition, and physiology as they apply to animal science.

Learning Activities: Seminar 1 hour(s).

Grade Mode: Satisfactory/Unsatisfactory only.

ANS 290C – Research Group Conference (1 unit)

Course Description: Weekly conference on research problems, progress and techniques in the animal sciences.

Prerequisite(s): Graduate standing.

Learning Activities: Discussion 1 hour(s).

Repeat Credit: May be repeated.

Grade Mode: Satisfactory/Unsatisfactory only.

ANS 291 – Current Research in Animal Science (1 unit)

Course Description: Current research in animal science explored at weekly seminars presented by guest lecturers. Discussion of research presented.

Prerequisite(s): Graduate standing.

Learning Activities: Seminar 1 hour(s).

Repeat Credit: May be repeated.

Grade Mode: Satisfactory/Unsatisfactory only.

ANS 297 – Supervised Teaching in Animal Science (2 units)

Course Description: Practical experience in teaching Animal Science at University level; curriculum design and evaluation; preparation and presentation of material. Assistance in laboratories, discussion sections, and evaluation of student work. Evaluation letter sent to the graduate advisor with copy to the student.

Learning Activities: Variable 6 hour(s).

Repeat Credit: May be repeated.

Grade Mode: Satisfactory/Unsatisfactory only.

ANS 298 – Group Study (1-5 units)

Course Description: Lectures and discussions of advanced topics in the animal sciences. (Sect. 1, 2, 3-letter grading; from Sect. 4 on-S/U grading only.)

Prerequisite(s): Consent of instructor.

Learning Activities: Lecture 1-5 hour(s), Discussion 1-5 hour(s).

Grade Mode: Letter.

ANS 299 – Research (1-12 units)

Course Description: Research.

Learning Activities: Variable.

Grade Mode: Satisfactory/Unsatisfactory only.