Animal Science (AN_SCI)

AN_SCI 1001: Topics in Animal Science
Various courses offered on a preliminary basis to determine need for such offering prior to submission as a numbered course. Various topics, credit arranged. There may be prerequisites enforced depending on the topic.

Credit Hour: 1-4

AN_SCI 1002: Topics in Animal Science- Lab
Various courses offered on a preliminary basis to determine need for such offering prior to submission as a numbered course. Various topics, credit arranged. There may be prerequisites enforced depending on the topic.

Credit Hour: 1-4

AN_SCI 1010: Orientation to Animal Sciences
This course is designed to introduce students to the field of animal sciences, opportunities within this field, and an array of campus resources. Graded on A-F basis only.

Credit Hour: 1
Prerequisites: Restricted to Animal Sciences majors or consent required

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AN_SCI 1011: Introduction to Animal Sciences
An introductory course for non animal sciences majors discussing the principles of animal sciences including the importance of animal agriculture, genetics, anatomy, physiology and nutrition.

Credit Hours: 4

AN_SCI 1011H: Animal Science - Honors
Principles of animal science including importance of animal agriculture, genetics, anatomy, physiology and nutrition.

Credit Hours: 3
Prerequisites: Honors eligibility required

AN_SCI 1012: Introduction to Captive Wild Animal Management
(same as F_W 1012). General introduction to housing, husbandry, behavior, genetics, nutrition, reproduction, animal health, and disease control of native and exotic species in zoological parks and other animal conservation facilities; emphasizes the role of captive animals in wildlife conservation. Graded on A-F basis only.

Credit Hours: 3

AN_SCI 1013: Biotechnology in Animal Agriculture
Concepts, discoveries, and applications of biotechnology ranging from the discovery of brewing and baking to animal cloning and genetic engineering are covered. Students will acquire a foundation to understand how biotechnology affects agriculture and our everyday lives. Graded on A-F basis only.

Credit Hours: 3

AN_SCI 1164: Biology of Animal Production I
This is an introductory course; a companion to Biology of Animal Production II. The overall intent of the courses is to provide an introduction to modern livestock production systems with emphasis on fundamental biological principles and their application in management of production animals. Key disciplines include genetics, nutrition, reproduction, physiology, health and behavior. This course is for non-Animal Sciences majors. No credit may be earned if taken after AN_SCI 1165. Graded on A-F basis only.

Credit Hours: 3

AN_SCI 1165: Biology of Animal Production I with Laboratory
This is an introductory course; a companion to Biology of Animal Production II. The overall intent of the courses is to provide an introduction to modern livestock production systems with emphasis on fundamental biological principles and their application in management of production animals. Key disciplines include genetics, nutrition, reproduction, physiology, health and behavior. The laboratory section of the course will provide hands on experience with livestock. Only 1 credit may be earned if taken after AN_SCI 1164. Graded on A-F basis only.

Credit Hours: 4
Prerequisites: This course is restricted to Animal Sciences students or requires consent

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AN_SCI 1165H: Biology of Animal Production I with Laboratory - Honors
This is an introductory course; a companion to Biology of Animal Production II. The overall intent of the courses is to provide an introduction to modern livestock production systems with emphasis on fundamental biological principles and their application in management of production animals. Key disciplines include genetics, nutrition, reproduction, physiology, health and behavior. The laboratory section of the course will provide hands on experience with livestock. Only 1 credit may be earned if taken after AN_SCI 1164. Graded on A-F basis only.

Credit Hours: 4
Prerequisites: This course is restricted to Animal Sciences students or requires consent. Honors eligibility required

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AN_SCI 1174: Biology of Animal Production II
This is an introductory course; a companion to Biology of Animal Production I. The overall intent of the courses is to provide an introduction to modern livestock production systems with emphasis on fundamental biological principles and their application in management of production animals. Key disciplines include genetics, nutrition, reproduction, physiology, health and behavior. Graded on A-F basis only. This section is open to all majors. No credit may be earned if taken after AN_SCI 1175.

Credit Hours: 3

AN_SCI 1175: Biology of Animal Production II with Lab
This is an introductory course; a companion to Biology of Animal Production I. The overall intent of the courses is to provide an introduction to modern livestock production systems with emphasis on fundamental biological principles and their application in management of production animals. Key disciplines include genetics, nutrition, reproduction, physiology, health and behavior. The laboratory section of the course will provide hands on experience with livestock. Only 1 credit may be earned if taken after AN_SCI 1174. Graded on A-F basis only.

Credit Hours: 4
Prerequisites: This course is restricted to Animal Sciences students or requires consent

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AN_SCI 1175H: Biology of Animal Production II with Lab - Honors
This is an introductory course; a companion to Biology of Animal Production I. The overall intent of the courses is to provide an introduction to modern livestock production systems with emphasis on fundamental biological principles and their application in management of production animals. Key disciplines include genetics, nutrition, reproduction, physiology, health and behavior. The laboratory section of the course will provide hands on experience with livestock. Only 1 credit may be earned if taken after AN_SCI 1174. Graded on A-F basis only.

Credit Hours: 4
Prerequisites: This course is restricted to Animal Sciences students or requires consent. Honors eligibility required

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AN_SCI 2001: Topics in Animal Science
Various courses offered on a preliminary basis to determine need for such offering prior to submission as a numbered course. Various topics, credit arranged. There may be prerequisites enforced depending on the topic.

Credit Hour: 1-4

AN_SCI 2002: Topics in Animal Science- Lab
Various courses offered on a preliminary basis to determine need for such offering prior to submission as a numbered course. Various topics, credit arranged. There may be prerequisites enforced depending on the topic.

Credit Hour: 1-4

AN_SCI 2010: Careers in Animal Sciences
This course is designed to explore the breadth and depth of careers in animal sciences. Students will develop a professional resume, practice interviewing skills, and assess the value of a job offer. Graded on A-F basis only.

Credit Hour: 1
Prerequisites: Restricted to Animal Sciences majors or consent required

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AN_SCI 2045: Equine Practicum
Focus on learning hands-on equine skills through the care of horses at the university's equine facility. Experiential learning is emphasized. Skills include: how to identify the general health and well-being of horses, recognize early onset of illness or lameness, understand basic feeding, housing, and daily care, and demonstrate the ability to handle and feed horses in a safe manner. Monthly meetings, scheduled feed shifts, monthly journals, required skill assessments, and attendance at various educational activities are required. Feed shift scheduling is determined around individual availability and no equine or animal experience is required. To enroll, students should contact the instructor for an application. Graded on A-F basis only.

Credit Hour: 1-2
Prerequisites: Instructor consent required

AN_SCI 2085: Problems in Animal Science
Library and laboratory study of assigned problems in animal breeding, nutrition, physiology or production and management. Planning, conduction and reporting to be in consultation with instructor.

Credit Hour: 1-5
Prerequisites: instructor's consent

AN_SCI 2090: Foal Training Practicum
This class focuses on practical skills associated with training and handling of foals (horses less than 6 months of age). During this class, students will gain experience in behavior modification strategies for horses. Students will work alongside the instructor to teach foals basics of haltering, leading, desensitization and ground manners. Training techniques will focus on safe and non-traumatic methods of teaching horses. No equine or training experience is necessary! Graded on A-F basis only.

Credit Hours: 2
Prerequisites: instructor's consent
Recommended: AN_SCI 2045

AN_SCI 2095: Equine Behavior and Training
Students learn the psychology and ethology of equine behavior and how it relates to training. The use and proper fitting of equipment is taught and students learn to teach horses to perform the basic movements needed prior to advancing to specialized training. Cannot be taken at the same time as AN_SCI 2195. Enrollment is limited to students who have completed AN_SCI 1001, or AN_SCI 1175.

Credit Hours: 3
Prerequisites: Instructor's consent

AN_SCI 2110: Global Animal Agriculture
Animal Agriculture as influenced globally by political, religious cultural, economic and climatic factors.

Credit Hours: 2
Prerequisites: sophomore standing

AN_SCI 2111: Sophomore Seminar: Societal Issues Facing Animal Agriculture
Course designed to introduce students to key issues facing animal agriculture. Assignments focus on reading current publications associated with issues affecting the animal agriculture industry. Graded on A-F basis only.

Credit Hours: 3
Prerequisites: ENGLSH 1000

AN_SCI 2111W: Sophomore Seminar: Societal Issues Facing Animal Agriculture - Writing Intensive
Course designed to introduce students to key issues facing animal agriculture. Assignments focus on reading current publications associated with issues affecting the animal agriculture industry. Graded on A-F basis only.

Credit Hours: 3
Prerequisites: ENGLSH 1000

AN_SCI 2112: Livestock and Literature
The human fascination with animals is documented throughout history. The impact of domesticated animals, and the livestock industry, on the human condition has been the focus of numerous authors across diverse literary genres. The care we provide for animals reflects the value we place on life, and often how we view society. This course will explore these themes while using varied fictional and non-fictional texts written in the 20th century.

Credit Hours: 3
Prerequisites: ENGLSH 1000

AN_SCI 2115: Livestock Judging
Comparative judging and evaluation; various classes of farm animals; particular reference to utility. Reference reading; illustrated lectures.

Credit Hours: 3
Prerequisites: Instructor's consent required

AN_SCI 2116: Animal Welfare Evaluation
Comparative evaluation of 4 animal welfare scenarios related to farm, zoo, lab, and exotic species. Welfare decisions are based on data and modern scientific literature. Graded on A-F basis only.

Credit Hours: 3
Prerequisites: Instructor's consent

AN_SCI 2131: Dairy Products Evaluation
(same as F_S 2131) Sensory Evaluation and judging of dairy products.

Credit Hours: 2

AN_SCI 2140: Companion Animals
(same as BIOMED 2140). Companion animals form an important part of our society. They serve us, provide companionship and many become members of our families. This class focuses primarily on dogs, cats, and horses. Topics covered include: the pet industry, breeds, wellness, management, care, training, zoonotic diseases, evolution and domestication, toxicology, nutrition, reproduction, genetics, human animal interactions, companion animal enterprise, and biomedical research. Students may enroll in one of two sections: service learning section or traditional course section.

Credit Hours: 3
Recommended: sophomore standing

AN_SCI 2140H: Companion Animals - Honors
Companion animals form an important part of our society. They serve us, provide companionship and many become members of our families. This class focuses primarily on dogs, cats, and horses. Topics covered include: the pet industry, breeds, wellness, management, care, training, zoonotic diseases, evolution and domestication, toxicology, nutrition, reproduction, genetics, human animal interactions, companion animal enterprise, and biomedical research. Students may enroll in one of two sections: service learning section or traditional course section.

Credit Hours: 3
Prerequisites: Honors eligibility required
Recommended: sophomore standing

AN_SCI 2146: Introduction to Animal Behavior
Explore animal behavior in domestic, zoo, and wild animals through a scientific approach. This course will begin with traditional animal behavior

theories and move into the application of animal behavior in modern situations. Students will finish this course with an understanding of the foundational concepts in animal behavior and be able to apply those concepts to the animals around them. Graded on A-F basis only.

Credit Hours: 3

AN_SCI 2187: Introduction To Foaling
This class focuses on practical skills associated with parturition and neonatal care of horses. Topics include identifying signs of impending parturition, creating action plans for problems during foaling, monitoring of benchmarks during the pre- and post-natal period, and assisting with neonatal care of foals. Students will gain hands on experience in each of these areas while assisting with foaling of mares at the Division of Animal Sciences Equine Teaching Facility. Enrollment is limited to students who have completed AN_SCI 2045. Graded on A-F basis only.

Credit Hours: 2
Prerequisites: Instructor's Consent

AN_SCI 2195: Equine Facility Management and Marketing
Focuses on learning equine facility management through student care and management of the University's equine facility and breeding herd. Students also learn handling techniques for a wide variety of horses and gain experience in general equine facility maintenance. Students will be responsible for marketing horses sold in the annual MU online horse auction. Cannot be taken at the same time as AN_SCI 2095. Enrollment is limited to students with Sophomore standing or higher. Graded on A-F basis only.

Credit Hours: 3
Prerequisites: Instructor's consent

AN_SCI 2214: Animal Products and Biotechnology
This course is designed to explore the variety of products that humans derive from animals for nutrition, fiber, and health and includes a laboratory session that promotes the working knowledge of methods for measuring animal product quality. Students will also assess factors related to consumer demand that influence the value of animal products. Graded on A-F basis only.

Credit Hours: 4
Prerequisites: Restricted to Animal Sciences majors or instructor's consent

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AN_SCI 2244: Introduction to Comparative Anatomy with Lab
Introduction into the vertebrate body structure and function, with an emphasis in the direct comparison between humans and non-human animals including but not limited to cattle, horses, swine, poultry, and rodents. Course topics include: cells and tissues, skeletal system, muscles and muscle tissue. This course will also touch on the cardiovascular system, the senses, respiratory system and animals as models of human disorders and diseases. Internet access required: lectures and portions of material will be online. On-campus laboratory meetings will allow students to explore various systems and gain experiential learning opportunities through manipulation, dissection, evaluation and use of Anatomy In Clay models to deepen the understanding of the material. Graded on A-F basis only.

Credit Hours: 3
Recommended: Freshmen or Sophomore standing

AN_SCI 3001: Topics in Animal Science
Various courses offered on a preliminary basis to determine need for such offering prior to submission as a numbered course. Various topics, credit arranged. There may be prerequisites enforced depending on the topic.

Credit Hour: 1-4

AN_SCI 3002: Topics in Animal Science- Lab
Various courses offered on a preliminary basis to determine need for such offering prior to submission as a numbered course. Various topics, credit arranged. There may be prerequisites enforced depending on the topic.

Credit Hour: 1-4

AN_SCI 3010: Graduate Experience Program
This course is designed to give undergraduates insight into the graduate student experience and to provide background knowledge in the various aspects of graduate level research as well as the application process for graduate school.

Credit Hour: 1
Prerequisites: Consent required

AN_SCI 3085: Problems in Animal Science
Current problems in animal breeding, nutrition, livestock production and management, meats. Assigned topics. In some cases student may undertake a project by outlining objectives, planning work, keeping records and summarizing results in written report. Some sections may be graded either on S/U or A-F basis only.

Credit Hour: 1-6
Prerequisites: instructor's consent

AN_SCI 3085W: Problems in Animal Science - Writing Intensive
Current problems in animal breeding, nutrition, livestock production and management, meats. Assigned topics. In some cases student may undertake a project by outlining objectives, planning work, keeping records and summarizing results in written report. Some sections may be graded either on S/U or A-F basis only.

Credit Hour: 1-6
Prerequisites: instructor's consent

AN_SCI 3190: Study Abroad: International Meat, Dairy and Enology
(same as F_S 3190). This study abroad course introduces students to the meat, dairy and wine industries in Germany or in New Zealand (destinations are on a rotational basis). Students will visit small, medium and large-scale producers and learn about differences in comparisons to the US industries. May be repeated once for credit.

Credit Hours: 3
Prerequisites: instructor's consent

AN_SCI 3213: Genetics of Agricultural Plants and Animals
(same as PLNT_SCI 3213). Concepts of molecular, transmission, and population and quantitative genetics. Special emphasis given to breeding and biotechnological applications in plant and animal agriculture. Prerequisites: MATH 1100 or higher and one of the following: BIO_SC 1100 or BIO_SC 1200 or BIO_SC 1500 or F_W 1100.

Credit Hours: 3

AN_SCI 3214: Principles of Meat Science
(same as F_S 3214). Study of the principles involved in the conversion of living animals to meat and by-products; efficient utilization of meat as a food.

Credit Hours: 3
Recommended: one course in Biology

AN_SCI 3231: Principles of Dairy Foods Science
(same as F_S 3231). Technology, chemistry and microbiology related to milk and its transformation into fluid milk products, fermented dairy foods and spreads. (2 hours of lecture and two hours of laboratory per week.)

Credit Hours: 3
Recommended: One course in Chemistry or Biological Sciences

AN_SCI 3242: Principles and Applications of Animal Nutrition
Fundamentals of animal nutrition, including digestion, absorption, metabolism, and function of nutrients; nutrient and energy requirements; feedstuffs used in livestock and companion animal nutrition; and integration of these principles with nutrition-based calculations to make nutritional management decisions. Graded on A-F basis only.

Credit Hours: 4
Prerequisites: MATH 1100 or higher, CHEM 1400 and CHEM 1401 or higher, Sophomore standing or higher

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AN_SCI 3242H: Principles and Applications of Animal Nutrition - Honors
Fundamentals of animal nutrition, including digestion, absorption, metabolism, and function of nutrients; nutrient and energy requirements; feedstuffs used in livestock and companion animal nutrition; and integration of these principles with nutrition-based calculations to make nutritional management decisions. Graded on A-F basis only. Prerequisites: MATH 1100 or higher; CHEM 1320 or higher; Sophomore standing or higher; Honors eligibility required

Credit Hours: 4

AN_SCI 3253: Physiology of Domestic Animals- All Majors
Course covers basic concepts of physiology and anatomy in vertebrate animals.

Credit Hours: 4
Prerequisites: Sophomore standing or higher. 4 credit section is open to all majors
Recommended: BIO_SC 1500 or F_W 1100, CHEM 1320, and MATH 1100 are strongly recommended. Students would also benefit from prior completion of CHEM 1330, CHEM 2030 (or CHEM 2100), and/or BIOCHM 3630

AN_SCI 3254: Physiology of Domestic Animals
Course covers basic concepts of physiology and anatomy in vertebrate animals.

Credit Hours: 5
Prerequisites: Sophomore standing or higher. 5 credit section (with lab) is restricted to Animal Sciences Majors Only
Recommended: BIO_SC 1500 or F_W 1100, CHEM 1320, and MATH 1100 are strongly recommended. Students would also benefit from prior completion of CHEM 1330, CHEM 2030 (or CHEM 2100), and/or BIOCHM 3630

AN_SCI 3254H: Physiology of Domestic Animals - Honors
Course covers basic concepts of physiology and anatomy in vertebrate animals.

Credit Hours: 5
Prerequisites: BIO_SC 1100 or BIO_SC 1500 or F_W 1100; CHEM 1320; Honors eligibility required. 5 credit section (with lab) is restricted to Animal Sciences majors
Recommended: CHEM 1330; CHEM 2030 or CHEM 2100

AN_SCI 3264: Physiology of Domestic Animals II
Advanced study of selected topics and systems in domestic animal physiology. Graded on A-F basis only.

Credit Hours: 3

Prerequisites or Corequisites: AN_SCI 3254 or BIO_SC 3700 or MPP 3202 or equivalent physiology course
Recommended: Foundational courses in biology and chemistry

AN_SCI 3270: Forage Crops
(same as PLNT_SCI 3270). An introduction to principle forage crops, including identification, anatomy, physiology, and growth characteristics. Pasture production and management, grazing systems, and forage preservation and utilization will also be covered.

Credit Hours: 3

AN_SCI 3275: Meat Animal Evaluation
Meat animal evaluation highlights the relationships and limitations that exist when evaluating market and breeding animals and develops an appreciation for carcass excellence as it relates to production, merchandising and consumption. Some travel time and commitments will be necessary.

Credit Hours: 3
Prerequisites: Instructor's consent

AN_SCI 4001: Topics in Animal Science
Various courses offered on a preliminary basis to determine need for such offering prior to submission as a numbered course. Various topics, credit arranged.

Credit Hour: 1-4
Prerequisites: instructor's consent

AN_SCI 4001W: Topics in Animal Science - Writing Intensive
Various courses offered on a preliminary basis to determine need for such offering prior to submission as a numbered course. Various topics, credit arranged.

Credit Hour: 1-4
Prerequisites: instructor's consent

AN_SCI 4010: Pasture-Based Dairy Management
(cross-leveled with AN_SCI 7010). The objective of the class is to give a broad overview of pasture-based dairying and instill a confidence for students evaluating if this type of animal agriculture is an occupation they want to pursue after graduation. The class is taught by experts from various departments in CAFNR and covers elements of dairy and forage production needed to be successful. Materials from this class are also cross-species related where information can be used on other ruminant type operations. Graded on A-F basis only.

Credit Hours: 2
Prerequisites: restricted to Junior and Seniors
Recommended: Background in dairy production, nutrition and reproductive physiology for Animal Science students or plant physiology and forage production for Plant Science students

AN_SCI 4010W: Pasture-Based Dairy Management - Writing Intensive
(cross-leveled with AN_SCI 7010). The objective of the class is to give a broad overview of pasture-based dairying and instill a confidence for students evaluating if this type of animal agriculture is an occupation they want to pursue after graduation. The class is taught by experts from various departments in CAFNR and covers elements of dairy and forage production needed to be successful. Materials from this class are also cross-species related where information can be used on other ruminant type operations. Graded on A-F basis only.

Credit Hours: 2
Prerequisites: restricted to Junior and Seniors
Recommended: Background in dairy production, nutrition and reproductive physiology for Animal Science students or plant physiology and forage production for Plant Science students

AN_SCI 4011: Pasture Based Dairy Management Lab
(cross-leveled with AN_SCI 7011). This course is a hands-on experience class taught over 4 days during spring break. The objective of the class is to give a broad overview of pasture-based dairying and instill a confidence for students evaluating if this type of animal agriculture is an occupation they want to pursue after graduation. The class is taught by experts from various departments in CAFNR and covers elements of dairy and forage production needed to be successful. Students will have the opportunity to interact with successful pasture-based dairy producers in Missouri and apply their experience from AN_SCI 4010 on real farm situations. Graded on A-F basis only.

Credit Hour: 1
Prerequisites or Corequisites: AN_SCI 4010

AN_SCI 4012: Elements of Experimental Surgery
(cross-leveled with AN_SCI 7012). This course implements the basics of surgery techniques as well as the laws and regulations governing the privilege of using vertebrate animals in research. Consideration for enrollment will be given first to graduate students. Graded on S/U basis only.

Credit Hour: 1
Prerequisites: Instructor's consent

AN_SCI 4312: Monogastric Nutrition
(same as NEP 4020; cross-leveled with AN_SCI 7312, NEP 7020). This course delves into the fundamentals and applications of monogastric animal nutrition, emphasizing applied and technical information for nutrition sciences. We will discuss specific nutrition considerations for pigs, poultry, equine, and other monogastric animals. Students will examine the nutrient and energy requirements of monogastric

species, the feedstuffs used in their nutrition, and the integration of these principles with feed formulation strategies and technical application. Students will participate in a research-intensive team-based learning community. This is a critical thinking based course. Graded on A-F basis only.

Credit Hours: 4
Prerequisites: AN_SCI 3242 or instructor's consent required

AN_SCI 4314: Physiology of Reproduction
(cross-leveled with AN_SCI 7314). Principles of animal reproduction with emphasis on endocrine control of reproductive processes.

Credit Hours: 3
Prerequisites or Corequisites: AN_SCI 3254 or MPP 3202 or BIO_SC 3700

AN_SCI 4314H: Physiology of Reproduction - Honors
Principles of animal reproduction with emphasis on endocrine control of reproductive processes.

Credit Hours: 3
Prerequisites or Corequisites: AN_SCI 3254 or MPP 3202 or BIO_SC 3700. Honors eligibility required

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AN_SCI 4323: Applied Livestock Genetics
(cross-leveled with AN_SCI 7323). Genetic principles applied to improvement of farm animals. Covers selection, prediction of genetic merit and mating systems.

Credit Hours: 3
Prerequisites: MATH 1100 or MATH 1160 or MATH 1400 or MATH 1500; AN_SCI 3213 or PLNT_SCI 3213 or BIO_SC 2200 or F_W 2500

AN_SCI 4323H: Applied Livestock Genetics - Honors
(cross-leveled with AN_SCI 7323). Genetic principles applied to improvement of farm animals. Covers selection, prediction of genetic merit and mating systems.

Credit Hours: 3
Prerequisites: MATH 1100 or MATH 1160 or MATH 1400 or MATH 1500; AN_SCI 3213 or PLNT_SCI 3213 or BIO_SC 2200 or F_W 2500. Honors eligibility required

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AN_SCI 4324: Genomics of Plants and Animals
(cross-leveled with AN_SCI 7324). Analysis of organisms at the level of the complete genome sequence. Covers genome sequencing, assembly and annotation, as well as functional, evolutionary and computational genomics.

Credit Hours: 3
Prerequisites: AN_SCI 3213 or PLNT_SCI 3213 or instructor's consent required

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AN_SCI 4332: Ruminant Nutrition
(cross-leveled with AN_SCI 7332). Physiology, chemistry, microbiology and pathology of ruminants. Emphasizes the digestion, absorption, metabolism and utilization of nutrients.

Credit Hours: 3
Prerequisites: AN_SCI 3001 or AN_SCI 3242

AN_SCI 4344: Processing Muscle Foods
(same as F_S 4344; cross-leveled with AN_SCI 7344, F_S 7344). Materials and technologies for the manufacture of muscle food products from red meats, poultry and seafood. Experience problem-solving through further processing of complex ingredients and develop skills by practicing operations in a pilot plant facility.

Credit Hours: 3
Recommended: One Chemistry course

AN_SCI 4354: Physiology and Biochemistry of Muscle as Food
(same as F_S 4354; cross-leveled with AN_SCI 7354, F_S 7354). Basic concepts in muscle growth and development of livestock evaluating the effects of environment, welfare, nutrition and genetics regarding muscle metabolism, physiology, and the ultimate condition of muscle as food.

Credit Hours: 3
Prerequisites: AN_SCI 3254 or MPP 3202 or BIO_SC 3700; AN_SCI 2001 or AN_SCI 2214 or AN_SCI 3214 or F_S 3214 or AN_SCI 3231 or F_S 3231
Recommended: Any Biochemistry or Organic Chemistry course

AN_SCI 4384: Reproductive Management
(cross-leveled with AN_SCI 7384). Reproductive management of cattle, swine and sheep; estrous synchronization; artificial insemination; embryo development and transfer; assisted reproductive technologies. Enrollment is restricted to students with senior standing that have completed or are currently enrolled in AN_SCI 4314.

Credit Hours: 3
Prerequisites or Corequisites: AN_SCI 4314
Prerequisites: Instructor's consent

AN_SCI 4385: Reproductive Management Laboratory
(cross-leveled with AN_SCI 7385). This laboratory is complementary to the reproductive management course (AN_SCI 4384). The objective of this laboratory is to provide hands on experience with semen handling, artificial insemination, embryo manipulation, and pregnancy diagnosis.

Credit Hour: 1

Prerequisites: Instructor's consent
Corequisites: AN_SCI 4384

AN_SCI 4386: Equine Reproduction
Focuses on reproductive management techniques and breeding in the horse. Topics include stallion collection and evaluation, artificial insemination, interpreting ultrasound images, teasing, parturition, and foal care. Graded on A-F basis only. Students will not receive credit if taken after AN_SCI 4387.

Credit Hours: 3
Prerequisites: AN_SCI 4314 and instructor's consent

AN_SCI 4387: Equine Breeding Management
Focuses on practical applications of reproductive management techniques and breeding in the horse. Topics include stallion collection and evaluation, artificial insemination, interpreting ultrasound images, teasing, parturition, and foal care. Students will gain hands-on experience in each of these areas. Students will receive 2 credits if taken after AN_SCI 4386.

Credit Hours: 5
Prerequisites: AN_SCI 4314 and instructor's consent

AN_SCI 4436: Animal Welfare
This course is a comprehensive assessment of animal welfare. Topics will cover livestock, lab, zoo, and companion animal welfare by considering their physiology, behavior, and affective state. The course begins with a description of the scientific and theoretical framework underlying welfare and moves throughout the semester by applying the science to different species. Students will be responsible for producing an educational deliverable item during the semester which will assist students by building on their understanding of animal welfare and will reflect the learning objectives of this course. Graded on A-F basis only. Prerequisites: Students must have taken and passed with grade of C or better in: AN_SCI 1011 or AN_SCI 1165 or AN_SCI 1175 or AN_SCI 1012 or F_W 1012 and AN_SCI 3254 or MPP 3202 or BIO_SC 3700 prior to the start of this course.

Credit Hours: 4

AN_SCI 4437: Stress Physiology
This online course will provide a general understanding of internal and external stress conditions that animals face throughout life. Since stress physiology can be expanded into many far-reaching and different areas, we will focus on specific topics that have a historical background and, at the same time, are pertinent in today's world. We will examine basic concepts of how stressors are received by the body and how it responds in both healthy and pathological situations. You will be able to relate many of the situations discussed in class to life events. In the end, you will acquire a better understanding of external, environmental and internal stressors and why we need some of them for normal growth and development. Finally, you will learn to apply concepts gained in this class to actual research presented in the scientific literature, and apply this ability to real-world scenarios in the future.

Credit Hours: 3
Prerequisites: AN_SCI 3254, MPP 3202, or BIO_SC 3700

AN_SCI 4910: Senior Seminar in Captive Wild Animal Management
(same as F_W 4910). Investigates key issues in captive wild animal management, focusing on the role of animal caretakers in addressing the issues. Students are required to formulate informed opinions regarding these topics and communicate effectively about the subject matter. Graded A-F only.

Credit Hour: 1
Prerequisites: AN_SCI 1012 or F_W 1012 or instructor's consent; junior or senior standing

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AN_SCI 4940: Internship in Animal Science & Technology
Off-campus training to develop technical skills and understanding of an area of animal science. Written reports required. Graded on an S/U basis only.

Credit Hour: 1-12
Prerequisites: instructor's consent

AN_SCI 4945: Experiential Learning in Industry Internship in Animal Science
Learning experience combining observation, application, and reflection in a discipline-based industry internship. Course appears on transcript for zero credit and does not count toward full-time enrollment. No tuition or fees are charged. Graded on S/U basis only.

Credit Hours: 0
Prerequisites: instructor's consent

AN_SCI 4950: Undergraduate Research in Animal Science
Individually directed field or laboratory research culminating in a poster or oral presentation for upper-class students under faculty supervision.

Credit Hour: 1-3
Prerequisites: At least sophomore standing or instructor's consent

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AN_SCI 4950H: Undergraduate Research in Animal Science - Honors
Individually directed field or laboratory research culminating in a poster or oral presentation for upper-class students under faculty supervision.

Credit Hour: 1-3
Prerequisites: At least sophomore standing or instructor's consent; honors eligibility required

AN_SCI 4955: Experiential Learning in Research in Animal Science
A supervised learning experience contributing to faculty research. Course appears on transcript for zero credit and does not count toward full-time enrollment. No tuition or fees are charged. Graded on S/U basis only.

Credit Hours: 0
Prerequisites: instructor's consent

AN_SCI 4973: Molecular and Cellular Techniques in Animal Science
A directed research project that employs current molecular and cellular technologies. Students will generate experimental data, analyze the data and draft a research report in the format of a scientific paper.

Credit Hours: 4
Prerequisites: instructor's consent
Recommended: an introductory course in biology and a course in organic chemistry, at least junior standing

AN_SCI 4975: Beef Production and Management
(cross-leveled with AN_SCI 7975). Systems of beef production: breeding, feeding, management of commercial and purebred beef cattle.

Credit Hours: 3
Prerequisites: AN_SCI 1165; AN_SCI 1175; AN_SCI 3242; AN_SCI 3254 or MPP 3202 or BIO_SC 3700; AN_SCI 3213
Recommended: AN_SCI 4314

AN_SCI 4975W: Beef Production and Management - Writing Intensive
(cross-leveled with AN_SCI 7975). Systems of beef production: breeding, feeding, management of commercial and purebred beef cattle.

Credit Hours: 3
Prerequisites: AN_SCI 1165; AN_SCI 1175; AN_SCI 3242; AN_SCI 3254 or MPP 3202 or BIO_SC 3700; AN_SCI 3213
Recommended: AN_SCI 4314

AN_SCI 4976: Dairy Production
(cross-leveled with AN_SCI 7976). Applied dairy science; emphasis on nutrition and management; herd health, labor-saving equipment, buildings, quality products, organization of dairy enterprise, business and economic aspects.

Credit Hours: 3
Prerequisites: AN_SCI 1001, or AN_SCI 1165; AN_SCI 3001 or AN_SCI 3242; or instructor's consent

AN_SCI 4976W: Dairy Production - Writing Intensive
(cross-leveled with AN_SCI 7976). Applied dairy science; emphasis on nutrition and management; herd health, labor-saving equipment, buildings, quality products, organization of dairy enterprise, business and economic aspects.

Credit Hours: 3
Prerequisites: AN_SCI 1001, or AN_SCI 1165; AN_SCI 3001 or AN_SCI 3242; or instructor's consent

AN_SCI 4977: Horse Production
(cross-leveled with AN_SCI 7977). Systems of horse production: breeding, feeding and management of horses.

Credit Hours: 3
Prerequisites: AN_SCI 1165; AN_SCI 1175; AN_SCI 3213; AN_SCI 3242; AN_SCI 3254 or MPP 3202 or BIO_SC 3700; or instructor's consent

AN_SCI 4978: Swine Production
(cross-leveled with AN_SCI 7978). Systems of pork production: breeding, feeding, management of commercial and purebred swine.

Credit Hours: 3
Prerequisites or Corequisites: AN_SCI 3242 or AN_SCI 3001 or instructor's consent
Prerequisites: AN_SCI 1001 or AN_SCI 1175, or instructor's consent
Recommended: AN_SCI 4314 and AN_SCI 3213

AN_SCI 4978W: Swine Production - Writing Intensive
Systems of pork production: breeding, feeding, management of commercial and purebred swine.

Credit Hours: 3
Prerequisites or Corequisites: AN_SCI 3242 or AN_SCI 3001 or instructor's consent
Prerequisites: AN_SCI 1001, or AN_SCI 1175, or instructor's consent
Recommended: AN_SCI 4314 and AN_SCI 3213

AN_SCI 4979: Poultry Production
(cross-leveled with AN_SCI 7979). Principles of housing systems, nutrition, management, business, and production of commercial chickens and turkeys.

Credit Hours: 3
Prerequisites: AN_SCI 1175; AN_SCI 1165; and AN_SCI 3242; or instructor's consent

AN_SCI 4979W: Poultry Production - Writing Intensive
(cross-leveled with AN_SCI 7979). Principles of housing systems, nutrition, management, business, and production of commercial chickens and turkeys.

Credit Hours: 3

Prerequisites: AN_SCI 1175; AN_SCI 1165; and AN_SCI 3242; or instructor's consent

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AN_SCI 7001: Topics in Animal Science
Various courses offered on a preliminary basis to determine need for such offering prior to submission as a numbered course. Various topics, credit arranged.

Credit Hour: 1-4
Prerequisites: instructor's consent

AN_SCI 7010: Pasture-Based Dairy Management
(cross-leveled with AN_SCI 4010). The objective of the class is to give a broad overview of pasture-based dairying and instill a confidence for students evaluating if this type of animal agriculture is an occupation they want to pursue after graduation. The class is taught by experts from various departments in CAFNR and covers elements of dairy and forage production needed to be successful. Materials from this class are also cross-species related where information can be used on other ruminant type operations. Graded on A-F basis only.

Credit Hours: 2
Recommended: Background in dairy production, nutrition and reproductive physiology for Animal Science students or plant physiology and forage production for Plant Science students

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AN_SCI 7011: Pasture Based Dairy Management Lab
(cross-leveled with AN_SCI 4011). This course is a hands-on experience class taught over 4 days during spring break. The objective of the class is to give a broad overview of pasture-based dairying and instill a confidence for students evaluating if this type of animal agriculture is an occupation they want to pursue after graduation. The class is taught by experts from various departments in CAFNR and covers elements of dairy and forage production needed to be successful. Students will have the opportunity to interact with successful pasture-based dairy producers in Missouri and apply their experience from AN_SCI 7010 on real farm situations. Graded on A-F basis only.

Credit Hour: 1
Prerequisites or Corequisites: AN_SCI 7010

AN_SCI 7012: Elements of Experimental Surgery
(cross-leveled with AN_SCI 4012). This course implements the basics of surgery techniques as well as the laws and regulations governing the privilege of using vertebrate animals in research. Consideration for enrollment will be given first to graduate students. Graded on S/U basis only.

Credit Hour: 1
Prerequisites: Instructor's consent

AN_SCI 7312: Monogastric Nutrition
(same as NEP 7020; cross-leveled with NEP 4020, AN_SCI 4312). This course delves into the fundamentals and applications of monogastric animal nutrition, emphasizing applied and technical information for nutrition sciences. We will discuss specific nutrition considerations for pigs, poultry, equine, and other monogastric animals. Students will examine the nutrient and energy requirements of monogastric species, the feedstuffs used in their nutrition, and the integration of these principles with feed formulation strategies and technical application. Students will participate in a research-intensive team-based learning community. This is a critical thinking based course. Graded on A-F basis only.

Credit Hours: 4
Prerequisites: AN_SCI 3242 or instructor's consent required

AN_SCI 7314: Physiology of Reproduction
(cross-leveled with AN_SCI 4314). Principles of animal reproduction with emphasis on endocrine control of reproductive processes.

Credit Hours: 3
Prerequisites or Corequisites: AN_SCI 3254 or BIO_SC 3700 or MPP 3202

AN_SCI 7323: Applied Livestock Genetics
(cross-leveled with AN_SCI 4323). Genetic principles applied to improvement of farm animals. Covers selection, prediction of genetic merit and mating systems.

Credit Hours: 3
Prerequisites: MATH 1100 or MATH 1160 or MATH 1400 or MATH 1500; AN_SCI 3213 or PLNT_SCI 3213 or BIO_SC 2200 or F_W 2500

AN_SCI 7324: Genomics of Plants and Animals
(cross-leveled with AN_SCI 4324). Analysis of organisms at the level of the complete genome sequence. Covers genome sequencing, assembly and annotation, as well as functional, evolutionary and computational genomics.

Credit Hours: 3
Prerequisites or Corequisites: AN_SCI 3213 or PLNT_SCI 3213 or equivalent
Prerequisites: BIO_SC 1010 and BIO_SC 1020 or BIO_SC 1500 or F_W 1100; MATH 1100

AN_SCI 7332: Ruminant Nutrition
(cross-leveled with AN_SCI 4332). Physiology, chemistry, microbiology and pathology of ruminants. Emphasizes the digestion, absorption, metabolism and utilization of nutrients.

Credit Hours: 3
Prerequisites: AN_SCI 3001 or AN_SCI 3242

AN_SCI 7344: Processing Muscle Foods
(same as F_S 7344; cross-leveled with AN_SCI 4344, F_S 4344). Materials and technologies for the manufacture of muscle food products from red meats, poultry and seafood. Experience problem-solving through further processing of complex ingredients and develop skills by practicing operations in a pilot plant facility.

Credit Hours: 3
Prerequisites: one Chemistry course

AN_SCI 7354: Physiology and Biochemistry of Muscle as Food
(same as F_S 7354; cross-leveled with AN_SCI 4354, F_S 4354). Basic concepts in muscle growth and development of livestock evaluating the effects of environment, welfare, nutrition and genetics regarding muscle metabolism, physiology, and the ultimate condition of muscle as food.

Credit Hours: 3
Prerequisites: AN_SCI 3254 or MPP 3202 or BIO_SC 3700; AN_SCI 2001 or AN_SCI 2214 or AN_SCI 3214 or F_S 3214 or AN_SCI 3231 or F_S 3231
Recommended: Any Biochemistry or Organic Chemistry course

AN_SCI 7384: Reproductive Management
(cross-leveled with AN_SCI 4384). Reproductive management of cattle, swine and sheep; estrous synchronization; artificial insemination; embryo development and transfer; assisted reproductive technologies.

Credit Hours: 3
Prerequisites or Corequisites: AN_SCI 7314
Prerequisites: Instructor's consent

AN_SCI 7385: Reproductive Management Laboratory
(cross-leveled with AN_SCI 4385). This laboratory course is to provide hands on experience with semen handling, artificial insemination, embryo manipulation and pregnancy diagnosis. Laboratory is complementary to the Reproductive Management course (AN_SCI 7384).

Credit Hour: 1
Corequisites: AN_SCI 7384

AN_SCI 7975: Beef Production and Management
(cross-leveled with AN_SCI 4975). Systems of beef production: breeding, feeding, management of commercial and purebred beef cattle.

Credit Hours: 3
Prerequisites: AN_SCI 1165; AN_SCI 1175; AN_SCI 3242; AN_SCI 3254 or MPP 3202 or BIO_SC 3700; AN_SCI 3213
Recommended: AN_SCI 4314

AN_SCI 7976: Dairy Production
(cross-leveled with AN_SCI 4976). Applied dairy science; emphasis on nutrition and management; herd health, labor-saving equipment, buildings, quality products, organization of dairy enterprise, business and economic aspects.

Credit Hours: 3
Prerequisites: AN_SCI 1001 or AN_SCI 1165; AN_SCI 3001 or AN_SCI 3242; or instructor's consent

AN_SCI 7977: Horse Production
(cross-leveled with AN_SCI 4977). Systems of horse production: breeding, feeding and management of horses.

Credit Hours: 3
Prerequisites: AN_SCI 1165; AN_SCI 1175; AN_SCI 3213; AN_SCI 3242; AN_SCI 3254 or MPP 3203 or BIO_SC 3700; or instructor's consent

AN_SCI 7978: Swine Production
(cross-leveled with AN_SCI 4978). Systems of pork production: breeding, feeding, management of commercial and purebred swine.

Credit Hours: 3
Prerequisites or Corequisites: AN_SCI 3242 or AN_SCI 3001 or instructor's consent
Prerequisites: AN_SCI 1001, or AN_SCI 1175, or instructor's consent
Recommended: AN_SCI 4314 and AN_SCI 3213

AN_SCI 7979: Poultry Production
(cross-leveled with AN_SCI 4979). Principles of housing systems, nutrition, management, business and production of commercial chickens and turkeys.

Credit Hours: 3
Prerequisites: AN_SCI 1175; AN_SCI 1165; and AN_SCI 3242; or instructor's consent

AN_SCI 8001: Topics in Animal Science
Various courses offered on a preliminary basis to determine need for such offering prior to submission as a numbered course. Various topics, credit arranged.

Credit Hour: 1-4
Prerequisites: Instructor's consent

AN_SCI 8085: Problems in Animal Science
Advanced independent studies in fields not directly related to thesis or non-thesis degree research program. May be graded on S/U or A-F basis only.

Credit Hour: 1-6
Prerequisites: instructor's consent

AN_SCI 8087: Seminar in Animal Science
Critical consideration of research and other selected subjects in animal breeding, animal nutrition, reproductive physiology, growth and development and livestock production and management.

Credit Hour: 1

AN_SCI 8090: Thesis Research in Animal Science
Investigations in animal breeding, animal nutrition, reproduction physiology, growth and development livestock production and management. Graded on a S/U basis only.

Credit Hour: 1-99

AN_SCI 8413: Reproductive Biology Seminar
Presentation and discussion of selected topics from all phases of reproductive biology. Open to qualified students of graduate standing in the field of Reproductive Biology.

Credit Hour: 1

AN_SCI 8414: Meat Quality
(same as F_S 8414). Discussion of factors affecting meat quality in beef, pork, lamb and poultry. Graded on A-F basis only.

Credit Hours: 3
Prerequisites: AN_SCI 3214 or equivalent

AN_SCI 8415: Survey of Epigenetics
This course will introduce graduate students to the basic concepts in epigenetics, including DNA methylation, histone modifications, epigenetic modifiers/transacting factors, non-coding RNAs, genomic imprinting, and dosage compensation. The course is designed to be a combination of lectures, paper discussions, and research talks by invited faculty speakers from across campus.

Credit Hours: 3
Prerequisites: instructor's consent

AN_SCI 8420: Endocrinology
Hormones of pituitary and endocrine glands; special reference to influence on growth, reproduction, milk secretion.

Credit Hours: 3
Prerequisites: AN_SCI 7314 or equivalent

AN_SCI 8424: Meat Investigations
(same as F_S 8424). Discussions of scientific literature and hands-on experimentation with research techniques customarily used in the field of meat science. Graded on A-F basis only.

Credit Hours: 3
Prerequisites: F_S 3214 /AN_SCI 3214 or equivalent; instructor's consent

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AN_SCI 8430: Introduction to Bioinformatics Programming
(same as PLNT_SCI 8430). This course provides the basics of programming and database development to students in the life sciences who have little prior programming experience. It covers Unix/Linux, Perl, MySQL, the relational database design process, and common data formats used in genome informatics. Students will learn how programming skills can enhance their ability to analyze large biological datasets, and will gain hands on experience with examples focused on genomics and bioinformatics. Graded on A-F basis only.

Credit Hours: 4
Prerequisites: Instructor's consent
Recommended: Undergraduate or graduate course in Genetics

AN_SCI 8431: Nutritional Biochemistry of Lipids
(same as NEP 8310, NUTRIT 8310). Current concepts in the nutritional regulations of lipid metabolism. Emphasis on integrating information and interpreting current research data.

Credit Hours: 3
Prerequisites: BIOCHM 4270 and BIOCHM 4272

AN_SCI 8434: Special Topics in Reproductive Biology
The physiological, hormonal, cellular and molecular mechanisms regulating development and function of reproductive systems of mammals will be studied with an emphasis on domestic animals, rodents, and humans. Current theories will be evaluated and discussed using information from recent scientific publications. Graded on A-F basis only.

Credit Hours: 3

AN_SCI 8441: Statistical Applications in Agriculture
(same as PLNT_SCI 8441). Techniques of experimentation, with application to livestock production and management. Exercises in methods of planning, conducting, analyzing, evaluating and reporting research.

Credit Hours: 3
Prerequisites: STAT 4530/STAT 7530 or equivalent or instructor's consent

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AN_SCI 8442: Digestive Physiology and Metabolism
The objective of this course is to provide graduate students in Animal Science and related areas with current knowledge in gastrointestinal physiology, including research methods used in nutrition and nutritional physiology. Graded on A-F basis only.

Credit Hours: 3
Prerequisites: At least one (each) undergraduate or graduate-level nutrition, physiology (general), and biochemistry course; or instructor's consent

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AN_SCI 8633: Molecular and Network Evolution
(same as BIO_SC 8633). Evolution of biological macromolecules and networks, including sequence analysis algorithms and theory, phylogenetics, gene duplication, genome evolution, principles of biological networks. Development of computational skills emphasized.

Credit Hours: 3
Prerequisites: Instructor's consent required

AN_SCI 8725: Science Outreach: Public Understanding of Science
(same as PHYSCS 8350, LTC 8725). Development of presentations to adult audiences on the science underlying issues of current interest. May be repeated for credit.

Credit Hour: 1-2

AN_SCI 9001: Topics in Animal Science

Credit Hour: 1-99
Prerequisites: instructor's consent

AN_SCI 9090: Dissertation Research in Animal Science
Investigations in animal breeding, animal nutrition, livestock production and management. Dissertation required. Graded on a S/U basis only.

Credit Hour: 1-99

AN_SCI 9423: Genetics of Populations
Theoretical and practical examination of the forces that affect genetic variation at a population level.

Credit Hours: 3
Prerequisites: Instructor's consent

AN_SCI 9432: Ruminant Nutrition
(same as NUTRIT 8320). Physiology, chemistry, microbiology, pathology of ruminants. Emphasizes digestion, absorption, metabolism, utilization of nutrients. Lecture, laboratory, assigned readings.

Credit Hours: 3
Prerequisites: AN_SCI 4332/AN_SCI 7332 or equivalent and BIOCHM 4270

AN_SCI 9433: Early Development of Mammalian Embryos, Assisted Reproductive Technologies and Biotechnology
Advanced graduate level course covering the physiology and pathology of fertilization, early embryo development and embryo implantation at multiple levels from molecular, subcellular and cellular level to tissue, system, whole body, individual and population levels. Advanced omics, reproductive biotechnologies, and assisted reproductive therapies are featured prominently. Course has a comparative aspect, focusing mainly on large animal models, with frequent cross-comparison with rodent models and humans, and references made to lower vertebrates and invertebrates. Graded on A-F basis only.

Credit Hours: 3
Recommended: AN_SCI 9434

AN_SCI 9434: Gonadal Function, Gamete Development and Reproductive Technologies
(same as BIOMED 9434). Focus on mammalian early embryo developmental events, with emphasis on gonadal development and germ cell formation, including methods and tools available for genome manipulation. Graded on A-F basis only.

Credit Hours: 3
Prerequisites: AN_SCI 8434 or equivalent
Recommended: a course in biochemistry and endocrinology or cell biology

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AN_SCI 9435: Placentation
Provide students with current and in-depth information about the mechanisms involved in placental development and how the placenta (and placental products) influence maternal physiology - both locally at the placenta-uterine interface and systemically. All course topics will be covered in a comparative cross-species approach whenever possible. Emphasis will be placed on the most recent literature regarding the interactions taking place between the placenta and maternal system and how these interactions lead to the eventual birth of live young.

Credit Hours: 3
Recommended: It is preferred that students take AN_SCI 9433 prior to this class, but this is not an absolute requirement

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AN_SCI 9442: Vitamins and Minerals
Designed to provide students with an understanding of the chemical, metabolic, and functional role of vitamins and minerals in nutrition. While the primary focus will be on animals, comparative aspects to human nutrition will be discussed.

Credit Hours: 4

Prerequisites: BIOCHM 4270 or equivalent