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### Animal Science

The School of Agricultural Sciences offers programs of study leading to the Master of Science degree in Animal Science. Programs may be designed either as thesis or non-thesis in the various disciplines of nutrition, reproductive physiology, biotechnology and/or growth and development with emphasis on beef cattle, dairy cattle, horses, swine, companion animals, fish or humans. Other animal or cell culture systems are sometimes used as research models.

### Master of Science (M.S.) in Animal Science

#### Admission

Admission to programs administered by the School of Agricultural Sciences must be approved by the Graduate Programs Committee. Application forms are available online at [gradschool.siu.edu/applygrad](https://gradschool.siu.edu/applygrad). Applicants must have the registrar of each college previously attended send official transcripts directly to the Animal Science program. This program requires a nonrefundable \$65 application fee that must be submitted with the application for Admissions to Graduate Study in Animal Science. Applicants pay this fee by credit card.

#### Requirements

Minimum requirements for students entering the M.S. in Animal Science program are:

1. A bachelor's degree in Animal Science, Dairy Science, Biological Sciences, or related field
2. A 3.0 cumulative undergraduate G.P.A. or better (A = 4.0) on the entire last undergraduate GPA earned at the time of application
3. 300 cumulative score; 3.0 analytical writing score on the Graduate Record Exam (GRE)
4. Statement of Research Interests
5. Three letters of recommendation (at least two from undergraduate professors)
6. TOEFL exam for international students. Students can be admitted with a G.P.A. between 2.7 and 3.0 on a conditional basis and must enroll in a minimum of seven credit hours of structured courses during their first semester and achieve a B or better in each course or be dropped from the program. Undergraduate courses cannot be given graduate credit

Minimum requirements for the M.S. in Animal Science degree may be fulfilled by satisfactory completion of 32 hours of graduate credit, with a minimum of 20 credit hours inside animal science, at least eight credit hours outside the School of Agriculture Sciences, and coursework must be 500-level graduate courses. Additional University requirements are stated in the SIUC Graduate Catalog. Specific required course work includes:

1. Two semesters of ANS 581 (Seminar)
2. Two semesters of graduate-level statistics
3. A minimum of one semester of upper-level biochemistry
4. One to three credit hours of ANS 595

Each student, whether in the thesis or non-thesis option, will be mentored by a member of the Animal Science Faculty designated as the major professor. The major professor will serve as the research mentor and academic advisor. A graduate advisory committee will be selected with consultation of the

major professor. The committee will consist of no fewer than three graduate faculty members. Two members of the committee must be from the Animal Science Faculty, and one of the members of the committee must be from outside the program. The major professor will chair the student's graduate committee.

All candidates in the thesis option are required to conduct original research. All candidates in the non-thesis option cannot take ANS 599 (Thesis) for graduate credit. All students are encouraged to participate in research within the program to provide a broader experience. Each M.S. in Animal Science degree candidate must pass a comprehensive oral examination covering all graduate work including the thesis or research paper.

Information concerning admission policies, requisites for graduation, and availability of financial assistance for graduate study in animal science may be obtained from the School of Agricultural Sciences, Southern Illinois University Carbondale, MC 4417, Carbondale, IL 62901 or 618-453-2329.

Research and teaching efforts for students consistently occur at the 2,000-acre SIUC Agricultural Research and Education Laboratories, which include a beef facility, a sow farrow-to-finish facility, an equine facility, and a unit focused on canine performance and management utilizing student and community provided dogs. The farm facilities serve the instructional and research focus by enabling and utilizing active, hands-on experiences for undergraduate and graduate students. Stakeholder feedback supports the critical thinking and experiential learning opportunities afforded by the use of the livestock facilities associated with the program.

## **Accelerated Master's Degree**

For outstanding students, the Animal Science (ANS) program offers a 4 year + 1 year accelerated Bachelor of Sciences (B.S.) and Master of Science (M.S.) degree option. The eligible student could take up to 9 hours of graduate level courses from approved undergraduate electives and have them count toward both the B.S. and M.S. degrees. As early as 2nd Year (3rd Year for transfer students), a student working with a faculty advisor would develop a program of study consistent with the student's interest and goals. To complete this five-year plan, up to 9 credit hours would double count toward an undergraduate and a master's degree. Students could take as few as 23 credit hours (32 total credit hours) after undergraduate graduation. Because the M.S. program requires that a student work on research, efforts related to developing and starting a research project in consultation with graduate mentor-advisor will be required prior to conditional acceptance into the program. The credit hours in the accelerated program must be declared prior to the conferral of the undergraduate degree.

## **Animal Science Courses**

**ANS409 - Equine Science** Designed for students interested in the more scientific aspects of equine physiology and management. The class will take a more advanced look at anatomy and physiology of the systems of the equine and consider how they relate to selection, use and management. Lecture and laboratory. Prerequisite: ANS 219 and 331. Fee: \$50. Credit Hours: 4

**ANS415 - Advanced Animal Nutrition** Advanced principles and practices associated with digestion, absorption, and metabolism of nutrients as related to domestic monogastrics, ruminants and horses. Prerequisite: ANS 215 and 315. Credit Hours: 4

**ANS419 - Stable Management** Designed for the advanced equine student planning a career in the horse field. Mastery of in-depth management techniques on an applied basis is emphasized. Farm, animal and personnel management are practiced. Extensive out-of-class practice time is expected. Prerequisite: ANS 409 with a grade of C or better. Lab fee: \$90. Credit Hours: 4

**ANS420 - Companion Animal Behavior-Animals at Work** This course focuses on the behavior of dogs and horses and will incorporate hands-on training techniques as well as pack/herd observation. Students will understand the difference between classical and operant conditioning, negative and positive reinforcement and will have the opportunity to observe social behavior, reproductive behavior, eating behaviors as well as dominant and submissive behaviors. Key features of the course include a study of

the work that dogs and horses perform for man as well as a history of how those working relationships developed. All students with a passion for animals are encouraged to enroll. Lab fee: \$50. Credit Hours: 3

**ANS421 - International Animal Production** A study of world animal production practices with emphasis on the developing countries. Adaptability of animals to environmental extremes and management practices employed to improve productivity. Prerequisite: ANS 121. Restricted to junior standing. Credit Hours: 2

**ANS422 - Nutritional Management of Zoo Animals** The class will provide students with the most recent information on nutrients requirements and feeding of zoo animals. Students will also learn about zoo animals digestive system and physiology, feeding behavior, nutrition disorders and diseases. Field trips to local zoos. Prerequisite: ANS 215 and ANS 315 with grades of C or better. Credit Hours: 4

**ANS425 - Biochemical Aspects in Nutrition** (Same as HND 425) The interrelationship of cell physiology, metabolism and nutrition as related to energy and nutrient utilization, including host needs and biochemical disorders and diseases requiring specific nutritional considerations. Prerequisite: ANS 215 or HND 320, CHEM 140B, PHSL 201 and 208. Credit Hours: 3

**ANS426 - Comparative Endocrinology** (Same as PHSL 426, ZOOL 426) Comparison of mechanisms influencing hormone release, hormone biosynthesis, and the effects of hormones on target tissues, including mechanisms of transport, receptor kinetics, and signal transduction. Prerequisites: ANS 331 or ZOOL 220 or PHSL 310 with a minimum grade of C. Laboratory/Field Trip fee: \$15. Credit Hours: 3

**ANS428 - Nutritional Management of Zoo Animals** The class will provide students with the most recent information on nutrient requirements and feeding of zoo animals. Students will also learn about zoo animals' digestive system, feeding behavior, physiology, nutrition disorders, and diseases. Prerequisites: ANS 215 and ANS 315 with grades of C or better. Credit Hours: 4

**ANS429 - Equine Enterprise Management** Study of the diverse horse industry and business management practices involved with the operation of a successful horse enterprise. Analysis of a commercial horse operation will be explored through an in-depth, self-directed farm project. Field trips and guest speakers will inform students for the farm project. An on-campus horse event will be planned and executed as a class project. Prerequisites: ANS 409, ABE 350 or 351. Field trip fee: \$40. Credit Hours: 2

**ANS430 - Dairy Cattle Management** Application of the principles of breeding, physiology, and economics to management of a profitable dairy herd. Breeds of dairy cattle, housing, milking practices, and quality milk production. Prerequisite: ANS 315. Lab/Field trip fee: \$50. Credit Hours: 4

**ANS431 - Reproductive Physiology** Comparative anatomy and physiology of the male and female reproductive system of domestic animals; hormones; reproductive cycles; mating behavior; gestation and parturition; sperm physiology; collection and processing of semen; artificial insemination, pregnancy tests; diseases. Course includes a weekly lab. Prerequisite: ANS 121, ANS 331. Laboratory fee: \$50. Credit Hours: 4

**ANS433 - Introduction to Agricultural Biotechnology** (Same as AGSE 433, CSEM 433, HORT 433, PLB 433, PSAS 433) This course will cover the basic principles of plant and animal biotechnology using current examples; gene mapping in breeding, transgenic approaches to improve crop plants and transgenic approaches to improve animals will be considered. Technology transfer from laboratory to marketplace will be considered. An understanding of gene mapping, cloning, transfer, and expression will be derived. Restricted to senior standing. Credit Hours: 3-7

**ANS434 - Physiology of Lactation** Anatomy and physiology of milk secretion; endocrine control; milk precursors and synthesis; milk composition; physiology and mechanics of milking; lactation-related disorders and diseases; transgenic milk. Prerequisite: ANS 331. Credit Hours: 2

**ANS435 - Agricultural Molecular Biotechnology Seminar** (Same as CSEM 435) Molecular biology is rapidly making important contributions to agricultural science through biotechnology. An appreciation of the techniques of molecular biology and their application to plant improvement is important to all in agriculture and biology. The relationships between plant molecular biology and the biotechnology industry

will be discussed. Presentations on particular research problems will be made. Graded P/F only. Credit Hours: 1-4

**ANS445 - Companion Animal Clinical Nutrition** Nutrition and feeding management of canine and feline during obesity, cancer, diabetes, urolithiasis, dental disease, dermatological disease, hepatic and gastrointestinal disorders, mobility and muscular disorders, heart diseases, and critical care. Prerequisite: ANS 215 with a grade of C or better. Credit Hours: 4

**ANS455 - Animal Nutrient Management** Scope and problems associated with animal nutrient management; current regulations and laws on environmental protection. Principles covering waste management technology and current livestock nutrient management systems are presented. Field trips will be scheduled. Restricted to junior standing. Credit Hours: 2

**ANS465 - Swine Management** Swine production systems and management techniques including breeding and selection, reproduction, nutrition, herd health and disease prevention, housing and waste management, marketing, production costs, and enterprise analysis. Field trip. Prerequisite: ANS 315 or consent of instructor. Lab fee: \$50. Credit Hours: 4

**ANS477 - Aquaculture** (Same as ZOOL 477) Production of food, game and bait fishes. Design of facilities, chemical and biological variables, spawning techniques, diseases and nutrition. Two lectures per week and one four-hour laboratory on alternate weeks. Prerequisites: BIOL 200A or BIOL 211 or ZOOL 118 or ANS 121 with grade of C or better. Credit Hours: 3

**ANS485 - Beef Cattle Management** Beef cattle production systems and management, breeding and selection, reproduction, nutrition, and herd health with emphasis on the most economical and efficient systems. Prerequisite: ANS 315, ANS 332 or concurrent enrollment. Lab/Field trip fee: \$50. Credit Hours: 4

**ANS495 - Instruction in the Animal Sciences** Acquaints the students with different teaching environments and styles. Students will be expected to participate in instructing animal science courses. Restricted to junior standing. Special approval needed from the instructor. Not for graduate thesis option credit. Credit Hours: 1-6

**ANS500 - Research Methods in Agricultural Science** Experimental design and biometry as applied to biological and allied fields. Restricted to graduate students. Credit Hours: 3

**ANS506 - Instrumentation Methods in Agricultural Science** Basic methods and techniques of analytical instrumentation used in human and animal nutrition are taught in the lectures with applications of instruments carried out in the laboratories. Special approval needed from the instructor. Lab fee: \$100. Credit Hours: 3

**ANS515 - Energy and Protein Utilization** (Same as FN 515) Energy and protein utilization including digestion, absorption and metabolism as related to mammalian physiology. Prerequisite: CHEM 339 or 340. Credit Hours: 3

**ANS516 - Minerals and Vitamins** (Same as FN 516) Basic and applied principles of mineral and vitamin metabolism. Emphasis on metabolic functions, reaction mechanisms and interrelationships Prerequisite: CHEM 339 or 340. Credit Hours: 3

**ANS525 - Ruminant Nutrition** Physiology of rumen, action and microbiology of rumen digestion and utilization of carbohydrates, lipids and nitrogenous substances in ruminant animals. Absorption and assimilation of nutrients by the ruminant animals. Feeding standards for maintenance, growth, reproduction and lactation. Two lectures per week. Prerequisite: ANS 415 or consent of instructor. Credit Hours: 3

**ANS531A - Advanced Animal Physiology** Advanced Physiological concepts as they relate to mammalian systems-subjects covered are: advanced reproductive physiology. Prerequisite: ANS 331 or PHSL 201. Credit Hours: 2

**ANS531B - Advanced Animal Physiology** Advanced Physiological concepts as they relate to mammalian systems-subjects covered are: developmental physiology. Prerequisite: ANS 331 or PHSL 201. Credit Hours: 2

**ANS531C - Advanced Animal Physiology** Advanced Physiological concepts as they relate to mammalian systems-subjects covered are: endocrine physiology. Prerequisite: ANS 331 or PHSL 201. Credit Hours: 2

**ANS563 - Fundamentals of Poultry** Fundamental principles of poultry production (broiler, turkey and egg production) including poultry physiology, breeding, incubation, housing, nutrition, disease control, management and marketing. Credit Hours: 1

**ANS564 - Aquaculture Techniques** (Same as ZOOL 564) Practical experience in aquaculture techniques. Course consists of modules which require student participation in hands-on experience, (e.g., spawning, induction of spawning, production of fry, operation and grading, diagnosis and treatment of parasites and diseases, and transporting of fish). One credit for completion of two modules. Register any semester, one year to complete elected number of modules. Written report and examination required for each module. Cost incurred by student varies with modules selected. Prerequisite: ANS 477 or ZOOL 477 or consent of instructor. Credit Hours: 1-2

**ANS565 - Advanced Ruminant Nutrition** Principles of nutrients metabolism and utilization by ruminant animals in relation to maintenance, growth, reproduction and lactation. Prerequisite: ANS 415 or consent of instructor. Credit Hours: 3

**ANS570 - Advanced Aquaculture** (Same as ZOOL 570) Special topics in aquaculture and practical methods for the production of coldwater, coolwater, warmwater, and tropical aquatic species. Prerequisite: ANS 477 or ZOOL 477 or equivalent with a grade of C or better. Credit Hours: 3

**ANS571 - Fish Reproduction and Breeding** (Same as ZOOL 571) Principles of finfish reproductive strategies, reproductive physiology and captive breeding. The role of genetics and the use of biotechnology and various techniques in breeding programs will also be emphasized. The purpose of this course is to develop an understanding of fish reproduction and breeding techniques and to gain an appreciation of the complexity involved in managing a hatchery breeding program. Two lectures a week and one four-hour lab alternate weeks. Prerequisite: ANS 477 or ZOOL 477 or equivalent with a grade of C. Credit Hours: 3

**ANS581 - Seminar** Problems relating to various phases of animal industries. Maximum of one hour per semester. Credit Hours: 1

**ANS588 - International Graduate Studies** University residential graduate study program abroad. Prior approval by the program is required both for the nature of the program and the number of credit hours. Credit Hours: 1-8

**ANS590 - Readings in Animal Science** Reading in specialized fields under direction of approved graduate specialists. Credit Hours: 1-3

**ANS592 - Global Research in Agriculture** Research interest in animals unique to certain regions of the world is a growing field to graduate students interested in world sustainable agricultural practices. This class is designed for students interested in taking research based information and skills from Southern Illinois University and applying it to projects with animals native to certain regions of the world to improve productivity and sustainability. This course provides graduate students interested in global and sustainable research the opportunity to conduct their research and training on regional animals not traditionally found in North America (eg. camels, water buffalo, kangaroo,... etc). Course fee up to \$5,000 per credit hour. Credit Hours: 1-3

**ANS593 - Individual Research** Investigation of a problem in animal science under the supervision of an approved graduate specialist. Credit Hours: 1-3

**ANS595 - Instruction in Animal Sciences** Acquaints the students with different teaching environments and styles. Students will be expected to aid faculty in the instruction of animal science courses. Credit Hours: 1-4

**ANS599 - Thesis** Credit is given for a Master's thesis when it is accepted and approved by the thesis committee. Not for non-thesis option credit. Credit Hours: 1-6

**ANS601 - Continuing Enrollment** For those graduate students who have not finished their degree programs and who are in the process of working on their dissertation, thesis, or research paper. The student must have completed a minimum of 24 hours of dissertation research, or the minimum thesis, or research hours before being eligible to register for this course. Concurrent enrollment in any other course is not permitted. Graded S/U or DEF only. Credit Hours: 1

## Animal Science Faculty

**AbuGhazaleh, Amer A.**, Professor, Ph.D., South Dakota State University, 2002; 2004. Dairy nutrition.

**Apgar, Gary A.**, Professor, Ph.D., Virginia Polytechnic Institute, 1994; 1998. Monogastric nutrition, swine production.

**Banz, William J.**, Professor, Ph.D., University of Tennessee, 1995; 1995. Nutritional physiology.

**Gastal, Eduardo L.**, Professor, DVM, Federal University of Pelotas, Brazil; Ph.D., University of Wisconsin-Madison, 1985; 1999; 2009. Reproductive physiology.

**Jones, Karen L.**, Professor, Ph.D., Texas A&M, 1999; 1999. Animal biotechnology, genetics reproductive physiology.

**Nair, Jayakrishnan**, Assistant Professor, Ph.D., University of Saskatchewan, 2017; 2021.

**Perry, Erin**, Associate Professor, Ph.D., University of Missouri, 2010.

## Emeriti Faculty

**Goodman, Bill L.**, Professor, Emeritus, Ph.D., Ohio State University, 1959; 1958.

**Hausler, Carl L.**, Associate Professor, Emeritus, Ph.D., Purdue University, 1970; 1970.

**King, Sheryl S.**, Professor, Emeritus, Ph.D., University of California, Davis, 1983; 1983.

**Kroening, Gilbert H.**, Professor, Emeritus, Ph.D., Cornell University, 1965; 1969.

**Minish, Gary**, Professor, Emeritus, Ph.D., Michigan State University, 1996;2004.

**Olson, Howard H.**, Professor, Emeritus, Ph.D., University of Minnesota, 1952; 1954.

**Young, Anthony W.**, Professor, Emeritus, Ph.D., University of Kentucky, 1969; 1980.

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