

ANSC - ANIMAL SCIENCE

ANSC101 Principles of Animal Science (3 Credits)

A comprehensive overview of the application of biology in the care and use of animals that live in close association with humans including food animals, companion animals, lab animals, zoo animals, etc. The role of science in modern food production using animals will be emphasized.

ANSC103 Principles of Animal Science Laboratory (1 Credit)

Laboratory focusing on the application of biology in the care and use of animals that live in close association with humans including food animals, companion animals, lab animals, zoo animals, etc. Labs will include live animals. Offered in fall semester only.

Prerequisite: Must have completed or be concurrently enrolled in ANSC101.

Restriction: Must be in one of the following programs (Environmental Sci & Pol-Environment & Agriculture; Agricultural and Veterinary Medicine; Agricultural Science and Technology) ; or must be in a major within the AGNR-Animal & Avian Sciences department; or permission of department required for students in other College of AGNR programs.

ANSC115 Careers in the Animal Sciences (1 Credit)

Discussion of current employment opportunities in Animal Science, primarily by invited speakers. In addition, students will have the opportunity to prepare resumes and improve oral presentation skills while working with their peers.

Prerequisite: ANSC101 and ANSC103.

ANSC120 Introduction to Dairy Judging (2 Credits)

Students will establish an understanding of dairy cattle anatomy and importance in dairy production, while gaining the ability to evaluate dairy cattle for soundness and show-ring appeal. Additionally, the class aims to provide students with confidence in justifying decisions of evaluation and gain confidence in public speaking.

ANSC121 Introduction to Livestock Judging (2 Credits)

Students will establish a working understanding of the structural anatomy of several livestock species- cattle, sheep, pigs, goats- and their individual importance in the Agricultural Industry, while gaining the ability to evaluate these species for soundness and show-ring appeal. Additionally, the class aims to provide students with confidence in justifying decisions of based on their evaluations and gain skills in public speaking. The course will include two weekend field trips to farms in order to practice judging skills.

ANSC204 Anatomy of Domestic Animals (2 Credits)

Covering the anatomy of major species of domestic animals. Utilizes a systemic approach to provide a general knowledge of both gross and microscopic mammalian structure. Comparative differences between the major domestic species are covered.

Prerequisite: ANSC101 and ANSC103. And BSCI105; or (BSCI170 and BSCI171).

Corequisite: ANSC205.

Restriction: Must be in one of the following programs (Environmental Sci&Pol-Wildlife Resources & Cons; Animal Sciences: Animal Care & Management; Animal Sciences: Equine Studies; Animal Sciences: Laboratory Animal Care; Animal Sciences: Sciences/Preprofessional; Animal Sciences: Animal Biotechnology; Agricultural and Veterinary Medicine).

Credit Only Granted for: ANSC211 or ANSC204 AND ANSC205.

Formerly: ANSC211.

ANSC205 Anatomy of Domestic Animals Laboratory (2 Credits)

A regional approach is taken to study the gross anatomy of major domestic species in the laboratory portion of this course.

Prerequisite: ANSC101 and ANSC103. And BSCI105; or (BSCI170 and BSCI171).

Corequisite: ANSC204.

Restriction: Must be in one of the following programs (Environmental Sci&Pol-Wildlife Resources & Cons; Animal Sciences: Animal Care & Management; Animal Sciences: Equine Studies; Animal Sciences: Laboratory Animal Care; Animal Sciences: Sciences/Preprofessional; Animal Sciences: Animal Biotechnology; Agricultural and Veterinary Medicine).

Credit Only Granted for: ANSC211 or ANSC204 and ANSC205.

Formerly: ANSC211.

ANSC210 Veterinary Terminology (1 Credit)

Students will learn terminology related to the clinical practice of small and large animal medicine including medical record terminology and a systems-based consideration of common practices and pathologies.

Prerequisite: ANSC204 and ANSC205.

Credit Only Granted for: The course is offered on-line through a series of self-paced modules on ELMS..

ANSC212 Applied Animal Physiology (3 Credits)

The physiology of domesticated animals with emphasis on functions related to homeostasis, and the physiological adaptation to environmental influences.

Prerequisite: ANSC211; or (ANSC204 and ANSC205); or students who have taken courses with comparable content may contact the department.

ANSC214 Applied Animal Physiology Laboratory (1 Credit)

Application of physiological laboratory techniques to domestic and lab animals.

Prerequisite: Must have completed or be concurrently enrolled in ANSC212.

ANSC220 Livestock Management (3 Credits)

Management of meat animals including beef, sheep, and swine. This course will emphasize obtaining optimal efficiency of production through the integration of leading edge breeding, feeding, management, and marketing practices.

Prerequisite: ANSC101 and ANSC103.

ANSC225 Love Me, Hate Me, Use Me, Save Me: Our Conflicting Views of Animals (3 Credits)

Examine the evolution of human-animal relationships and consider some of the major social and scientific debates that have arisen in the last century as a result of our rapidly changing and diverse views about animals.

ANSC226 The Future of Animal Agriculture (3 Credits)

Offers students the opportunity to learn about the history of animal agriculture in the United States and envision what its future might be as it adapts to major challenges such as our growing global population, climate change, food injustice, antimicrobial and insecticide resistance, animal welfare concerns, and farmer distress. The course will examine technological & biotechnological, agroecological, and social innovations that address these issues while providing healthy, safe, nutritious food. Students are invited to learn about these issues and to create and propose their own solutions through weekly 'extend your learning' opportunities and a course project in animal agricultural extension.

Additional Information: The course is hosted on ELMS-Canvas and will require students to have reliable access to the internet.

ANSC227 Eating with Eyes Wide Open (3 Credits)

Students will investigate the tension that is created by trade-offs that, knowingly or not, are made by consumers relative to agricultural production methods and dietary choices. Course will inform students about their food supply so they can make informed decisions and practice intentional or informed eating.

ANSC232 Horse Management (3 Credits)

An introductory course on the care, management, and use of horses. Major topics include the industry, breeds, conformation, feeding, health, reproduction, facilities and business.

Prerequisite: ANSC101 and ANSC103.

Credit Only Granted for: ANSC232 or ANSC332.

Formerly: ANSC332.

ANSC233 Equine Behavior (2 Credits)

Both normal and anomalous behavior of horses will be covered. Emphasis will be given to techniques based on knowledge of behavior that are known to be safe and effective in handling horses.

Prerequisite: ANSC101, ANSC103, and ANSC232.

Credit Only Granted for: ANSC489B or ANSC233.

Formerly: ANSC489B.

ANSC235 Applied Small Ruminant Parturition (2 Credits)

Popularly known as 'Lamb Watch', the course provides an immersion environment for learning and understanding pre- and post-natal care of ewes and lambs through direct, hands-on involvement in the birthing process and care of the neonate through weaning. Covered topics include zoonoses, basic reproductive physiology of the sheep, normal and abnormal delivery, management of lambs, qualitative assessment, breeding principles, etc.

Prerequisite: Minimum grade of C- in ANSC101 and ANSC103.

Restriction: Must be in one of the following programs (Animal Sciences: Animal Care & Management; Animal Sciences: Equine Studies; Animal Sciences: Laboratory Animal Care; Animal Sciences: Sciences/Preprofessional; Animal Sciences: Animal Biotechnology; Agricultural and Veterinary Medicine).

ANSC236 Equine Business Management (3 Credits)

The study and practice of applying decision-making skills and tools needed for operating a profitable equine boarding or training stable business.

Prerequisite: ANSC232.

Recommended: AREC250.

Credit Only Granted for: ANSC236 or INAG232.

ANSC237 Equine Reproductive Management (3 Credits)

Students learn the fundamental skills necessary to manage an equine breeding herd including anatomy/physiology of genital tracts, estrus detection, manipulation of the estrous cycle, semen collection, pre- and post-foaling techniques, infertility, and health and nutrition of the mare, foal and stallion. Students will be required to spend ~ 30 hours during the spring semester caring for broodmares and foals and attending at least one foaling and estrous detection checks on broodmares outside of regularly scheduled class time.

Prerequisite: ANSC232.

Credit Only Granted for: ANSC237 or INAG233.

Additional Information: Course participation will include nightly checks of mares in the two weeks prior to parturition, and out-of-class time imprinting and working with newborn foals.

ANSC242 Dairy Cattle Management (3 Credits)

All aspects of dairy production, including nutrition, reproduction, mastitis control, milking management, farmstead facilities, financial management and forage production.

Prerequisite: ANSC101 and ANSC103.

Formerly: ANSC240 and ANSC241.

ANSC244 Dairy Cattle Type Appraisal (1 Credit)

Laboratory. Analysis of dairy cattle type with emphasis on the comparative judging of dairy cattle.

Prerequisite: Permission of AGNR-Animal & Avian Sciences department.

ANSC245 Sheep Management (3 Credits)

Popularly known as 'Lamb Watch', this course provides an immersion environment for learning and understanding pre- and post-natal care of ewes and lambs through direct, hands-on involvement in the birthing process and care of the neonate through weaning on the campus farm. Course topics include zoonoses, basic reproductive physiology of the sheep, normal and abnormal parturition, management of lambs, qualitative assessment, breeding principles, nutrition, products and their marketing, and ram management.

Prerequisite: Minimum grade of C- in ANSC101 and ANSC103.

Restriction: Must be in one of the following programs (Animal Sciences: Animal Care & Management; Animal Sciences: Equine Studies; Animal Sciences: Laboratory Animal Care; Animal Sciences: Sciences/Preprofessional; Animal Sciences: Animal Biotechnology; Agricultural and Veterinary Medicine).

Credit Only Granted for: ANSC235 or ANSC245.

ANSC250 Companion Animal Care and Management (3 Credits)

Care and management of the companion small animals. Species covered include the cat, dog, rodents, lagomorphs, reptiles, amphibians, birds and others as class interest and schedule dictate. Basic description, evolutionary development, breeding, nutritional and environmental requirements, and public health aspects will be presented for each species.

Credit Only Granted for: ANSC250 and ANSC305.

Formerly: ANSC305.

ANSC252 Introduction to the Diseases of Wildlife (3 Credits)

The principal diseases of North American wildlife will be briefly considered. For each disease, specific attention will be given to the following: signs evidenced by the affected animal or bird, causative agent, means of transmission and effects of the disease on the population of the species involved.

Prerequisite: BSCI105; or (BSCI170 and BSCI171); or permission of AGNR-Animal & Avian Sciences department; or students who have taken courses with comparable content may contact the department.

ANSC255 Introduction to Aquaculture (3 Credits)

Introduces the art and science of rearing aquatic animals and the essential principles of aquaculture. Students receive hands-on training in the methods required for successful husbandry and management of aquatic animals in their water environment.

Prerequisite: ANSC101 and ANSC103; or must have completed an introductory biology course.

ANSC260 Laboratory Animal Management (3 Credits)

A comprehensive course in care and management of laboratory animals. Topics covered include regulations governing the use of animals in research, laboratory animal facility design and management, animal research models, animal health management and husbandry, responsibilities of lab animal workers and career opportunities in the field. Hands-on labs focus on lab animal handling, husbandry and common techniques. Field trips are required, and you must attend a minimum number of field trips which will be held during lab time.

Prerequisite: ANSC101 and ANSC103.

Credit Only Granted for: ANSC260 or ANSC413.

Formerly: ANSC413.

ANSC262 Commercial Poultry Management (3 Credits)

Theory and science of rearing poultry and marketing poultry meat and eggs in the commercial sector. Includes current issues, organization of the industry, as well as fundamental biology of the domestic chicken. Students will help raise a flock of broiler chickens. Field trips to commercial poultry operations are required.

Prerequisite: ANSC101 and ANSC103.

ANSC270 Animal Enterprise Management (3 Credits)

General principles of enterprise organization, management, and operation as applicable to food, livestock, and companion animals. Enterprise planning and establishment, management of financial, human, and animal resources, and other related topics will be investigated.

Prerequisite: ANSC101 and ANSC103; or permission of instructor.

Credit Only Granted for: ANSC270 or AREC306.

ANSC275 Introduction to Veterinary Medical Science and Practice (3 Credits)

The fundamentals of clinical veterinary medical practice and the research that supports it. Topics presented will include the histology, gross anatomy and physiology of the musculoskeletal, cardiovascular, respiratory, reproductive, digestive, renal and neurological systems as they relate to the description of specific disease states taught in this course. Additionally, examples of diseases caused by pathologic disturbances to these systems will be discussed, as well as the basic principles of preventative health care, diagnostic testing and pharmacologic intervention. Significant attention will be given to research in veterinary science and the practice of evidence-based medicine. This course is intended for any student interested in veterinary medicine, animal physiology, or medical science.

Prerequisite: BSCI105; or (BSCI170 and BSCI171).

ANSC282 Grazing Animal Management (3 Credits)

For students interested in acquiring knowledge and skills in pasture management, grazing management of livestock (large and small ruminants, horses), and hay production. Fundamental information regarding best management practices for soils, plants, and grazing livestock will be covered.

Prerequisite: ANSC101 and ANSC103; or permission of instructor.

Credit Only Granted for: ANSC110, ANSC282, or INAG116.

Formerly: ANSC110.

ANSC314 Comparative Animal Nutrition (3 Credits)

The fundamental role and implications of dietary preference, gastrointestinal physiology and nutrients in animal nutrition. Biochemical roles of nutrients in metabolism, digestion, absorption and assimilation as it relates to various life processes.

Prerequisite: ANSC101 and ANSC103; and (CHEM231 or PLSC275).

ANSC315 Applied Animal Nutrition (3 Credits)

Elements of nutrition, source characteristics and adaptability of various feedstuffs to several classes of livestock. A study of the composition of feeds, nutrient requirements and computerized formulation of economic diets and rations for livestock.

Prerequisite: ANSC314.

ANSC327 Molecular and Quantitative Animal Genetics (3 Credits)

Classical, molecular, and population genetics with specific emphasis on animal systems will be covered. Also, disseminate information on molecular approaches for manipulating genetics at the whole animal level (transgenic and cloning). Other model organisms will be discussed to provide a conceptual framework.

Prerequisite: ANSC101, CHEM131, and ANSC103. And BSCI105; or (BSCI170 and BSCI171).

ANSC330 Equine Science (3 Credits)

Scientific principles of horse behavior, anatomy, physiology, locomotion, nutrition, reproduction, growth, health and disease as applied to horses are emphasized.

Prerequisite: ANSC232; or permission of instructor.

Recommended: ANSC212 and ANSC211.

Credit Only Granted for: ANSC230 or ANSC330.

Formerly: ANSC230.

ANSC340 Health Management of Animal Populations (3 Credits)

A study of common and emerging animal diseases and their prevention and control. The main focus will be on livestock and poultry diseases. However, zoonotic, wildlife, and laboratory animal diseases will also be discussed along with risk assessment, bioterrorism counter-measures, and animal welfare, especially as these topics interface or impact animals used in food production.

Prerequisite: BSCI223; and (ANSC220, ANSC232, ANSC242, ANSC250, ANSC255, ANSC260, or ANSC262).

Recommended: ANSC212.

Credit Only Granted for: ANSC340 or ANSC412.

Formerly: ANSC412.

ANSC359 Internship Experience in Animal and Avian Sciences (3-6 Credits)

Experiential learning is a key component in an animal science education. Through the internship program, you will have the opportunity to develop your expertise in a specific species and discipline within the animal science curriculum. You will arrange an on- or off-campus internship experience related to animal science. You will spend a specified number of hours at the internship site each week and attend biweekly classroom sessions where we will discuss how the study of animal science fits into your specific internship experience as well as understand how to achieve each of the course learning outcomes.

Prerequisite: ANSC220, ANSC232, ANSC242, ANSC250, ANSC255, ANSC260, or ANSC262.

Restriction: Must be in a major within the AGNR-Animal & Avian Sciences department; and permission of instructor.

Repeatable to: 6 credits if content differs.

Additional Information: Students are required to submit an application to the Animal Science Internship Coordinator to enroll in this course.

ANSC379 Animal Science Undergraduate Teaching Assistant Seminar (2 Credits)

Seminar course for undergraduate teaching assistants within ANSC.

Prerequisite: Permission of instructor.

Repeatable to: 8 credits.

Formerly: ANSC390.

ANSC386 Experiential Learning (3-6 Credits)

Prerequisite: Permission of AGNR-Animal & Avian Sciences department.

Restriction: Junior standing or higher.

ANSC388 Honors Thesis Research (3-6 Credits)

Undergraduate honors thesis research conducted under the direction of an AGNR faculty member in partial fulfillment of the requirements of the College of AGNR Honors Program. The thesis will be defended to a faculty committee.

Restriction: Must be in the AGNR Honors program.

Repeatable to: 6 credits if content differs.

ANSC389 Experiential Learning (3-6 Credits)

Prerequisite: Permission of AGNR-Animal & Avian Sciences department.

Restriction: Junior standing or higher.

Repeatable to: 6 credits if content differs.

Formerly: ANSC386.

ANSC398 Seminar - Research (1 Credit)

Presentation and discussion of current literature and research work in animal science.

Prerequisite: ANSC101 and ANSC103.

Repeatable to: 2 credits if content differs.

ANSC399 Special Problems in Animal Science (1-2 Credits)

Work assignments are designed to be proportional to the amount of credit. Students are expected to develop an abstract, fact sheet, manuscript, oral presentation, poster, webpage, journal-log, or other scholarly product associated with their study and/or project.

Prerequisite: ANSC101 and ANSC103.

Restriction: Permission of AGNR-Animal & Avian Sciences department; and junior standing or higher.

Repeatable to: 6 credits if content differs.

ANSC410 The Gut Microbiome and its Roles in Health and Disease (3 Credits)

A comprehensive perspective of the role of gut microbiome/microflora in nutrition, metabolism, disease prevention and health issues including farm animal health and food value, and human gastrointestinal health and immunity.

Prerequisite: BSCI223, ANSC212, ANSC327, EPIB301, BSCI222, BSCI421, or NFSC430; or students who have taken courses with comparable content may contact the department.

Credit Only Granted for: ANSC489M or ANSC410.

Formerly: ANSC489M.

ANSC417 Regulatory Issues in Animal Care and Management (3 Credits)

A study of regulatory issues affecting animal care and management in the livestock industry. Guest speakers and classroom discussions will focus on key topics including animal welfare, feed and drug regulations, animal identification, CAFO management, processing and marketing of animal products.

Prerequisite: ANSC220, ANSC232, ANSC242, ANSC250, ANSC255, ANSC260, ANSC262, or ANSC282; or permission of instructor.

Additional Information: Field trips may be required for this course.

ANSC435 Experimental Embryology (3 Credits)

Experimental approaches to mammalian embryology with emphasis on domestic livestock systems as applied to research and production systems. Lab will include hands-on experiments and demos of in vitro embryo production, embryo splitting, cell injection and nuclear transfer.

Prerequisite: ANSC212.

Recommended: Completion of one course in reproductive physiology is recommended.

Credit Only Granted for: ANSC435 or ANSC489M.

Formerly: ANSC489M.

ANSC436 Animal Health Policy and Communication (3 Credits)

Intended for upper level students in Veterinary Medicine or Animal Science as well as other students who are interested in understanding how science and politics interact and influence animal health policy and how veterinarians and animal scientists can effectively communicate science to non-scientists such as legislators and policymakers.

Recommended: Completion of ANSC225 and ANSC340 recommend.

Restriction: Must be in a major within the AGNR-Animal & Avian Sciences department; or permission of AGNR-VA-MD Regional COL Veterinary Med.

Credit Only Granted for: ANSC489A or ANSC436.

Formerly: ANSC489A.

ANSC437 Animal Biotechnology (3 Credits)

Key concepts and current issues in animal biotechnology are covered. Current techniques and applications systems as well as social, ethical, and regulatory issues associated with biotechnology will be discussed.

Prerequisite: ANSC327; or students who have taken courses with comparable content may contact the department.

ANSC440 Zoonotic Diseases and Control (3 Credits)

Global perspective of foodborne diseases common to animals and man, specifically those caused by farm animal-originated human pathogens (zoonoses) and their control. A selection of important zoonoses and food safety issues will be specifically covered with an emphasis on the principles of zoonotic disease transmission and control, risk factors to humans, and surveillance methods.

Prerequisite: BSCI223, ANSC212, ANSC327, BSCI222, BSCI421, or NFSC430; or students who have taken courses with comparable content may contact the department.

Credit Only Granted for: ANSC440 or ANSC489R.

Formerly: ANSC489R.

ANSC443 Physiology of Lactation (3 Credits)

A comprehensive survey of lactation in laboratory and domestic animals. Other species are discussed where possible. Emphasis will be placed on physiological aspects of milk synthesis and secretion and on the cellular and molecular biology of mammary gland development.

Prerequisite: CHEM231, ANSC212, and CHEM232.

Recommended: BCHM463.

ANSC444 Domestic Animal Endocrinology (3 Credits)

Current developments in endocrinology as it relates to animals used in the production of food and other products important to the well being of humans will be covered.

Prerequisite: ANSC212; or permission of instructor.

Restriction: Must not have completed ANSC644.

Credit Only Granted for: ANSC489I, ANSC444, or ANSC644.

Formerly: ANSC489I.

ANSC446 Physiology of Mammalian Reproduction (3 Credits)

Anatomy and physiology of reproductive processes in domesticated and wild mammals.

Prerequisite: ANSC212 or BSCI440.

ANSC447 Physiology of Mammalian Reproduction Laboratory (1 Credit)

Gross and micro-anatomy, artificial insemination, estrous cycle synchronization and invitro-fertilization procedures and analytical techniques useful in animal management and reproduction.

Prerequisite: Must have completed or be concurrently enrolled in ANSC446.

ANSC450 Animal Breeding Plans (3 Credits)

Design of animal breeding programs for the genetic improvement of livestock and companion animal species. Principles of population and quantitative genetics. Genetic evaluations of animals, selection strategies and crossbreeding systems. Incorporation of statistics and biotechnology into animal breeding plans.

Prerequisite: ANSC101; and 1 course with a minimum grade of C- from (MATH120, MATH130, MATH136, MATH140).

Restriction: Junior standing or higher.

ANSC452 Avian Physiology (3 Credits)

The digestive, excretory, respiratory, circulatory, immune, skeletal muscle, endocrine and nervous systems of avian species will be examined.

Prerequisite: ANSC212.

Restriction: Junior standing or higher.

ANSC453 Animal Welfare and Bioethics (3 Credits)

Ethical concerns related to the use of animals in modern society. Historical and philosophical overview of animal welfare and bioethics. Applied ethical discussions on human/animal interrelationships, physical and genetic manipulation, and other current issues associated with the treatment of animals used in food production, research, zoos, and as pets.

Prerequisite: ANSC101 and ANSC103; or BSCI106; or (BSCI160 and BSCI161); or permission of instructor.

Restriction: Junior standing or higher.

ANSC454 Nutritional Aspects of Metabolic Disease (3 Credits)

Biochemical and physiological fundamentals of nutrition. Discussion of protein, fat, carbohydrate, minerals and vitamins and their roles and interrelationships in nutrition, metabolism and diseases in humans and animals. The course will use recommended texts for foundation material as well as research papers to provide in-depth coverage and illustrate emerging themes in metabolic aspects of nutrition and disease.

Prerequisite: CHEM131 and ANSC101, or BSCI170; or students who have taken courses with comparable content may contact the department.

Credit Only Granted for: ANSC4890 or ANSC454.

Formerly: ANSC4890.

ANSC455 Applied Animal Behavior (3 Credits)

Principles of animal behavior applied to production systems in animal agriculture.

Prerequisite: ANSC101 and ANSC103; or BSCI106; or (BSCI160 and BSCI161).

ANSC460 Comparative Vertebrate Immunology (3 Credits)

Basic concepts in immunology, and comparing immunity in different vertebrates, including organization of immune systems, innate and adaptive immune responses. Special attention will be paid to how cell-mediated and humoral immune responses are induced in natural infections, and what are the effector mechanisms in both of these processes. Immune response in representative disease models such as infections with viruses and bacteria, cancer, and autoimmune disease will be discussed. Lectures concerning cutting-edge research will also be given.

Prerequisite: ANSC212, BSCI201, or BSCI440.

Credit Only Granted for: ANSC460 or ANSC4891.

Formerly: ANSC4891.

ANSC489 Current Topics in Animal Science (1-3 Credits)

Examination of current developments in the animal sciences.

Repeatable to: 6 credits if content differs.

ANSC497 Animal Biotechnology Recombinant DNA Laboratory (3 Credits)

An advanced course offering hands-on experience in performing recombinant DNA experiments. Current molecular biology techniques used for cloning genes, analyzing the gene products, and modifying the genes of animals will be performed. Techniques include isolation of DNA, use of restriction enzymes; cloning procedures, PCR analysis, and Southern hybridizations. Lecture material focuses on interpretation of results generated in the laboratory.

Prerequisite: ANSC327; or students who have taken courses with comparable content may contact the department.

Recommended: ANSC437 and ANSC435.