

## AGRICULTURE UNDERGRADUTE COURSES

**AGR 100T (099) Transitions (1).** Course is designed to assist students in their transition to Murray State University. Content includes orientation to the specific area or major(s) and minor(s) within the academic program; university procedures, policies, and resources; strategies for personal and academic success, and extracurricular opportunities. Only one transitions course will count toward graduation. Course is required of all entering freshmen. Graded pass/fail. (Fall)

**AGR 100 Animal Science (3).** This is a basic course in animal science including the importance and place of livestock in agriculture; types, market classes and grades of beef, sheep, poultry and swine; origin and characteristics of breeds; and the judging of beef, sheep and swine.

**AGR 101 Basic Stock Seat Horsemanship (3).** Designed for students with previous experience in the handling and riding of horses. Includes instruction in grooming, saddling, bridling and mounting, and the development of basic riding skills at the walk, trot and canter. Prerequisite: AGR 109 or approval of instructor.

**AGR 102 Beginning Hunt Seat Equitation (1).** Designed for beginner riders in their first year and for riders that are considered safe to ride an unfamiliar horse in a group at a canter. Heavy emphasis is placed on developing a competent rider with proper hunt seat equitation skills. Weekend participation in Intercollegiate Horse Show Association horse shows is mandatory. Participation in weekend riding clinics is required. Prerequisites: AGR 101 and approval of instructor.

**AGR 103 Intermediate Hunt Seat Equitation (1).** Designed for intermediate riders in their first or second year of riding and for riders that are considered safe to ride an unfamiliar horse in a group at a canter. A higher degree of proficiency at the walk, sitting trot, posting trot, two point, and canter is required more than in AGR 102. Emphasis is placed on learning suppling exercises for horse and rider in addition to developing a competent rider with proper hunt seat equitation skills. Weekend participation in Intercollegiate Horse Show Association horse shows is mandatory. Participation in weekend riding clinics is required. Prerequisites: AGR 102 and approval of instructor.

**AGR 104 Advanced Hunt Seat Equitation (1).** Designed for advanced riders that are considered safe to ride an unfamiliar horse in a group at a canter and gallop. A higher degree of proficiency at the walk, sitting trot, posting trot, two point, center and gallop is required more than in AGR 103. Emphasis is placed on the correct application of riders natural aids, suppling of the horse, collection and riding on the bit. To develop competent riders with professional equitation skills. Weekend participation in Intercollegiate Horse Show Association horse shows is mandatory. Participation in weekend riding clinics is required. Prerequisites: AGR 103 and approval of instructor.

**AGR 105 Introduction to Rodeo (2).** An introduction to rodeo designed to develop a better understanding of the events and rules of the sport through lectures, demonstrations, rodeo films, and hands-on practice. The course will include instructions in equipment care and preparation and mental and physical training using weights, calisthenics, etc. May be repeated once for additional credit.

**AGR 106 Beginning Stock Seat Equitation (1).** Designed for beginner riders in their first or second year of riding and for riders that are considered safe to ride an unfamiliar horse in a group at a lope. Emphasis is placed on developing a competent well-rounded stock seat rider with proper stock seat equitation skills. Weekend participation in Intercollegiate Horse Show Association horse shows is mandatory. Participation in weekend riding clinics is expected. Prerequisite: AGR 101 and approval of instructor.

**AGR 107 Intermediate Stock Seat Equitation (1).** Designed for the intermediate rider in their first or second year of riding and for riders that are considered safe to ride an unfamiliar horse in a group at a canter. A higher degree of proficiency at the walk, jog or lope is required more than in AGR 106. Emphasis is placed on learning suppling exercises for horse and rider in addition to developing a competent rider with proper stock seat equitation skills. Weekend participation in Intercollegiate Horse Show

Association horse shows is mandatory. Participation in weekend riding clinics is required. Prerequisites: AGR 106 and approval of instructor.

**AGR 108 Advanced Stock Seat Equitation (1).** Designed for the advanced rider that is considered safe to ride an unfamiliar horse in a group at a lope. A higher degree of proficiency at the walk, jog, and lope is required more than in AGR 107. Emphasis is placed on the correct application of the riders natural aids, suppling of the horse, collection, and riding on the bit. In addition to developing a competent stock seat equitation rider. Prerequisites: AGR 107 and approval of instructor.

**AGR 109 Beginning Horsemanship Experience (3).** Designed for students with no previous riding or horse-handling experience. Prepares student for recreational horsemanship activities and for potential enrollment in Basic Horsemanship. Includes instruction in catching, haltering, grooming, saddling, and riding at the walk and trot.

**AGR 110 Livestock Event Production and venue Management (2).** An introductory class designed to help individuals develop an understanding of the procedures and requirements involved with the production of a livestock related event, both sporting and show. The course will include instruction in contracts, budgets, advertising, liability requirements, arena setup, labor requirements, equipment needs, event production, etc.

**AGR 111 Basic Forward Seat Equitation (3).** Designed for students with previous experience in the handling and riding of horses. Includes instruction in grooming, saddling, bridling, mounting, and the development of basic riding skills at the walk, trot, and canter. Must have previous horse handling and riding experience. Prerequisite: permission of instructor.

**AGR 130 Agricultural Economics (3).** A study of fundamental principles of economics as applied to agriculture. Attention is given to resource use, economic growth, production fundamentals, economic institutions and agriculture in relation to national and world economics.

**AGR 133 Field Applications for Agriculture (2).** Course will teach students methods of solving many application problems that will be encountered in the field of agriculture using applied mathematical and logic skills. The emphasis will be to use practical mathematical skills already acquired from secondary education to address agricultural situations involving computations that are necessary for upper level courses in agriculture. Some knowledge of agricultural situations may be required. Possible field trips to the university farms during class time. Prerequisite: Declared area or major in agriculture or permission of instructor.

**AGR 160 Horticultural Science (3).** A study of the practical principles and practices used in horticulture.

**AGR 170 Introduction to Agricultural Systems Technology (3).** An introduction to agricultural systems including: power and machinery, electricity, precision agriculture, soil and water engineering, metallurgy and fabrication, and safety. Emphasis is placed on understanding the technology involved in operating, maintaining, and managing these systems.

**AGR 180 Skill Development in Horticulture (3).** Course will document that students can demonstrate the competencies and skill necessary for occupations in the landscaping industry, turf and lawn management, nursery management, and/or vegetable and flower production areas. Credit will be by challenge exam only according to university policy and will be granted upon successful completion of the state horticulture skills standards test and completion of a career major in horticulture at the secondary school level.

**AGR 181 Skill Development in Agriculture Production and Agribusiness (3).** Course will document that students can demonstrate the competencies and skill necessary for occupations in production agriculture and agribusiness. Emphasis will be placed on the development of scientific knowledge and skills pertaining to management of agribusinesses, farms, and cooperatives, and/or of the land and its effect on food and fiber production. Credit will be by challenge examination only according to university policy and will be granted upon successful completion of the State Agriculture Production Skills standards test and completion of a career major in horticulture, and/or successful completion of the State Agriculture Production Skills standards test and completion of a Career Pathway in that area at the secondary school level. May be repeated for a maximum of six credit hours.

**AGR 182 Introduction to veterinary Science (3).** Course examines basic principles of veterinary science, including breeds, biology, veterinary tools parasitology, office management, animal control, and basic clinical exam techniques for large and small animals. The purpose of this course is to provide upper classmen agricultural education students, at the high school level, with an introduction to the basic principles of veterinary science. This requires students to understand the biology of both large and small breeds of animals, as well as specifics related to the area of veterinary medicine. This class will build a foundation for those high

school students interested in the area of veterinary science while serving as a dual credit course to gain elective credit through Murray State University.

**AGR 190 Basic Spanish and Culture for Agriculture (3).** Introductory Spanish course with an emphasis on agricultural terminology designed for basic communication in Spanish between agricultural employers and their Spanish-speaking employees. It includes a study of Hispanic culture and the contribution of migrant workers to the U.S. agricultural industry. Students may not receive credit for both this course and SPA 105 or 106. (Same as SPA 106.)

**AGR 199 Contemporary Issues in Agriculture (3).** A course designed to increase the understanding, awareness, and critical analysis of contemporary agricultural issues and their effect upon the social, political, economic and cultural aspects of society. Topics will include environmental, bio-technology, animal, crop, career, economy and trade, agricultural policy, food quality/safety and international agriculture issues.

**AGR 200 International Agriculture Experience (3).** A course designed to enhance students' understanding of international agriculture and how it relates to the overall impact on world food processing and production through travel/study abroad. An emphasis is placed on experiences which have the potential to impact and add value to American/Kentucky agriculture, as well as those which hold key relationships to U.S. based agricultural trade and food development. Prerequisites: AGR 130 and at least one subject specific agriculture technical course.

**AGR 201 Intermediate Horsemanship (3).** Designed for students with previous experience in the handling of horses. Deals with instruction in hunt seat and stock seat with emphasis placed on bareback equitation skills. Prerequisites: AGR 101 or 111, and approval of instructor.

**AGR 223 Introduction to Artificial Insemination for Cattle (3).** The primary objective of this course is to instruct students in artificial insemination in cattle. Topics will include reproductive system, herd health and nutrition, semen handling, and estrus detection and synchronization.

**AGR 240 Crop Science (3).** A study of the fundamental principles underlying the production of agricultural crops. Lecture, two hours; laboratory, two hours per week.

**AGR 247 Tobacco Production (3).** An agriculture course designed for students who desire to expand their knowledge of tobacco production. Students will be introduced to the practical aspects of tobacco production in the Kentucky tobacco types.

**AGR 261 General Pomology (3).** General principles and practices involved in handling home and commercial planting of the major fruit crops.

**AGR 262 vegetable Crop Production (3).** A study of the fundamental principles underlying commercial and home garden production of vegetables. (Spring, odd years)

**AGR 263 Woody Plant Materials I (2).** The identification and use of woody deciduous plant materials in the landscape.

**AGR 269 Introduction to Forestry (3).** A general introduction to the many aspects of forestry including dendrology, silvics, silviculture, and wood utilization. Some emphasis will be placed on the management of forest lands for recreation and wildlife purposes.

**AGR 300 Principles of Animal Nutrition (3).** A study of digestion, absorption and utilization of nutrients, characteristics of feedstuffs, nutritional disorders and nutrient requirements of animals. Prerequisite: AGR 100.

**AGR 301 Livestock Judging and Evaluation (3).** A study of types of purebred and commercial beef cattle, sheep and swine, both market and breeding classes. Special emphasis is placed on writing and giving oral reports. Prerequisite: AGR 100. (Fall)

**AGR 302 Horse Science (3).** Involves a study of the role of the light horse and the development of an equine vocabulary. Topics covered include the basic nutritional, housing and health requirements of the light horse. (Fall)

**AGR 303 Advanced Horse Science (3).** Deals with various topics of interest to the horseman including psychology, evaluation, anatomy and health care. Prerequisite: AGR 302. (Spring)

**AGR 304 Advanced Stock Seat (3).** This course is concerned with basic training techniques and the development of equitation skills using the western seat.

Prerequisites: AGR 201 and approval of instructor. (Fall)

**AGR 306 Advanced Forward Seat (3).** This course presents equitation skills and techniques utilizing the forward seat. Included in the course are hunt seat, show seat, and other methods of English style equitation. Principles of schooling the jumping horses are emphasized. Prerequisites: AGR 201 and approval of instructor. (Spring)

**AGR 308 Applied Equine Management (3).** Practical application of management principles involving health, nutrition, grooming, and training of horses. Prerequisite: approval of instructor.

**AGR 309 Equine Facility Management (3).** A course designed for the equine student to study the economics and business related aspects of facility management. Students will be taught the value of short and long term planning and the decision making process that is involved in the operation of a commercial equine facility. Some weekend attendance will be required.

**AGR 310 Applications in Animal Technology (3).** The study of animal technology involving management, nutrition and health of small and large animal species. Lecture, two hours; laboratory, two hours. Prerequisite: AGR 100.

**AGR 311 Beef Science (3).** A study of the history and importance of the beef cattle industry; phases of beef production, selection, breeding, feeding, and management of beef cattle. Lecture, two hours; laboratory, two hours. Prerequisites: AGR 100. (Spring)

**AGR 312 Dairy Science (3).** A study of dairy breeds, calf raising, herd replacements, milk production, nutrition and management of dairy herds. Prerequisite:  
AGR 100 and 300. (Spring)

**AGR 313 Livestock Production Management Systems (3).** Study of production management, nutrition, and breeding of farm animals. Will include on-the-farm training with livestock. Prerequisite: AGR 100.

**AGR 314 Small Ruminant Science (3).** A study of the history and importance of the goat and sheep industries, with emphasis on meat goat production; phases of production, selection, breeding, feeding, and management of goats and sheep will be covered. Prerequisite: AGR 100.

**AGR 315 Equine Exercise Physiology (3).** The study of conditioning of the equine athlete using the basic principles of exercise physiology, energetics, kinetics, and sports medicine. Emphasis on equine anatomical and physiological adaptations to exercise, assessment of physical fitness and conditioning in horses, nutrition and feeding requirements of working animals, moral and ethical considerations related to equine performance, and evaluation of common ailments and current therapies used in equine sports medicine. Prerequisite: AGR 303 and/or permission of instructor.

**AGR 316 Dairy Cattle Selection and Evaluation (3).** Origin, characteristics and developments of major breeds of dairy cattle. Improvement programs. Apply the principles involved in herd improvement to the selection of breeding animals for dairy herds. Fundamental aspects of evaluation of dairy cattle. Comparative terminology, decision-making and presentation of oral reasons. Lecture, two hours; laboratory, two hours. Prerequisite: AGR 100. (Fall)

**AGR 317 Equine Health Care and Management (3).** An in-depth study of the health and soundness of a horse and its relationship to growth, performance, and reproduction with emphasis on development of a horse health program. Emphasis on evaluation of health status for various ages and classes of horses, assessment of treatment options for common equine ailments, development of proficiency in practical techniques related to horse health care, and application of critical thinking to ethical issues related to equine care. Prerequisite: AGR 303 and/or instructor permission.

**AGR 318 Equine Forage Management (3).** A study of forage systems designed specifically for equine.

**AGR 319 Equine Nutrition and Feeding (3).** Course focuses on the study of anatomy and physiology of the gastro-intestinal system and its role in digestion and utilization of feeds, with particular emphasis on the horse. Students will develop rations to feed various classes of horses and address the relationship of nutrition and health. Prerequisite: AGR 303 or permission of instructor.

**AGR 320 Livestock Behavioral Analysis (3).** A study of species specific to livestock handling techniques based upon proven techniques, methods and livestock behavioral patterns. This class will include on the farm training with livestock. Prerequisite: AGR 100.

**AGR 321 Poultry Science (3).** An introductory study of the various phases of poultry production, diagnosis and treatment of diseases, nutrition, processing and management practices for commercial poultry operations. Prerequisite: AGR 100. (Spring)

**AGR 322 veterinary Laboratory Principles (3).** An introductory course to the veterinary laboratory for the veterinary technologist. Laboratory safety, microscopy, specimen collection, diagnostic analysis, laboratory instrumentation and techniques are taught for development of proficient laboratory skills. Two one-hour lectures; one two-hour laboratory. Prerequisite: AGR 310.

**AGR 324 veterinary Diagnostic Imaging (3).** Students will be exposed to learning appropriate diagnostic imaging skills needed in the field of veterinary technology. Students will learn handling and restraint techniques of small and large animals, as it relates to diagnostic imaging in areas of radiology, ultrasonography, and endoscopy. Students will also learn utilization of radiographic equipment, safety measures, equipment maintenance, along with proper positioning and exposures with small and large animals. Each week there will be two 1-hour lectures and one 2-hour lab. Prerequisite: AGR 310.

**AGR 325 Small Animal Science (3).** A study of the history and importance of the small and exotic animal industry; breeds, selection and management are topics which will be covered; Prerequisite: AGR 310.

**AGR 326 Swine Science (3).** Basic principles and their application in pork production — breeding, selection, nutrition, housing, equipment and economic management. Lecture, two hours; laboratory, two hours. Prerequisite: AGR 100. (Fall)

**AGR 328 Statistics for Food and Agriculture (3).** A course designed to enhance the quantitative skills of agriculture students. Techniques include descriptive statistics, probability, analysis of variance, and regression analysis. Discussion, examination and use of these techniques will cover and be limited to agriculturally related topics.

**AGR 329 veterinary Hematology and Microbiology (4).** This course is designed to introduce the animal health technology student to basic concepts, theories and techniques of veterinary hematology and microbiology. Basic normal values of various species of animals will be covered with common microorganisms of animal diseases. Prerequisites: AGR 310 and 322. (Fall)

**AGR 330 Principles of Agribusiness (3).** The organization of agribusiness, its development in local communities, and the roles played by farmers, farm suppliers, processors, wholesalers, retailers, consumers and government. Analysis of the job opportunities in agribusiness. (Spring)

**AGR 331 Small Animal Diseases (3).** A study of the more common and important diseases of dogs and cats. The clinical signs, life cycles of pathogenic organisms, progression of symptoms and control of the diseases will be discussed. Prerequisite: AGR 310.

**AGR 332 veterinary Nursing (3).** Course designed to teach veterinary technology students the essentials of clinical animal nursing as it relates to the appropriate theories, practices, procedures, and skill development utilized in veterinary medicine. Two one-hour lectures; one two-hour laboratory. Throughout the semester, mandatory outside skill building assignments/activities will also be required, resulting in additional time required outside of class/laboratory. Prerequisites: AGR 310 and 322.

**AGR 333 Agribusiness Records and Analysis (3).** Fundamental principles necessary to keep farm and agribusiness firm accounts and to analyze these accounts for profitability. Budgeting, amortization, depreciation and the application of microcomputer technology to the management and financial control of the agribusiness firm. (Fall)

**AGR 334 Entrepreneurship in Agribusiness (3).** A study of fundamental principles of entrepreneurship as applied to agribusinesses. Attention is given to entrepreneurial creativity, business plans, marketing, accounting and finance, and management practices and strategies in small businesses. Prerequisite: AGR 130.

**AGR 335 Farm Systems Management (3).** This course focuses on the business aspects of production agriculture. Emphasis is on balance sheet and income statement analysis, capital and credit use, enterprise, partial and whole farm budgeting, and investment analysis. Economic principles and cost concepts as they relate to agriculture are also discussed. The student will learn to apply these tools to develop a farm management plan.

**AGR 336 Agricultural Marketing and Price Analysis (3).** A study of the nature of food and fiber consumption and demand, production and supply of farm products, marketing margins and price determination for specific agricultural commodities. (Fall, odd years)

**AGR 337 Agricultural Sales and Merchandising (3).** A course designed to enhance the students' abilities to sell agriculturally related products. An emphasis is placed on agricultural customer and market knowledge and the skills required satisfying customer needs. Students are required to contact and spend time with agricultural sales professionals.

**AGR 338 Rural Economic Development (3).** An examination of the basic principles underlying the economic development of rural areas. The impact and role of agricultural and community organizations and their influence on the rural economy will be studied. Each student will make a special socioeconomic study of his/her community including a resource inventory and plan for economic development. (Summer, with sufficient demand)

**AGR 339 Computer Applications for Agriculture (3).** A course designed to develop an understanding and practical knowledge of the use of computers with respect to their application to problem-solving within agriculture. Students will receive hands-on experience in applying a variety of agriculture specific software to problems in agriculture and agricultural business management.

**AGR 340 veterinary Laboratory Sciences (3).** This course is divided into four sections: veterinary science, toxicology, necropsy and laboratory animal science. Course is designed to acquaint the student with basic pharmacology and toxicology, submission of tissue samples to diagnostic laboratories, necropsy techniques and common practices associated with laboratory animals. Prerequisites: AGR 332, BIO 300, and five hours of chemistry.

**AGR 341 Seed Production and Technology (3).** Special emphasis is given to the production and processing of seed, evaluation and testing for quality, and the study of viability during storage. (Spring)

**AGR 342 Seed, Crop and Grain Analysis (3).** Skills related to the evaluation of crops for quality relative to certification, viability, and marketing will be taught. The subjects that will be taught include seed analysis, plant and seed identification and grain grading. Prerequisite: AGR 240.

**AGR 345 Soil Science (3).** A general study of soil properties including classification development, use of fertilizers, and conservation. Corequisite: AGR 346.

**AGR 346 Soil Science Laboratory (1).** Consists of a number of lab exercises that support the course material in AGR 345. Corequisite: AGR 345.

**AGR 350 Soil Survey (3).** Principles of soils origin and classification including field mapping. Lecture, two hours; laboratory, two hours. Prerequisite: AGR 345. (Spring)

**AGR 353 World Food, Agriculture, and Society (3).** Course will provide students with a basic understanding of various world agriculture systems that provide food. Analysis of the role of society, historical, environmental, technological, socio-economic, and political factors that affect world food will be addressed. The course will also include topics on the evolution of agriculture, technology and food trends over the world as it has been shaped by society, culture, and world population growth. Specific issues on food poverty and malnutrition in developing countries, culture and food habits, climate changes impacting agriculture productions, and other constraints to world food production will be covered.

**AGR 355 Soil Judging (2).** Emphasis on recognition, description and classification of soil horizons in a soil profile and then placing this soil in the U.S. Classification System. This course is designed for those interested in conservation and teaching careers. May be repeated for a maximum of four credits. (Fall)

**AGR 360 Greenhouse Production and Management (3).** A study of producing plants under transparency. Includes greenhouse management problems; heating, cooling, and humidity control; also cultural practices of several different crops. Lecture, two hours; laboratory, two hours. Pre- or corequisite: AGR 160.

**AGR 361 Horticulture and Greenhouse Management Practicum (3).** A hands-on work study course that allows for the management and maintenance of all university greenhouse and horticultural components. Prerequisites: AGR 360 and permission of instructor.

**AGR 362 Floral Design (3).** Operation and management of a retail florist establishment with emphasis on floral design.

**AGR 363 Woody Plant Materials II (2).** The identification and use of woody evergreen plant materials in the landscape.

**AGR 364 Nursery Management (3).** A study of establishing and managing a nursery practice including field grown container stock, wholesale and retail nursery business practices, and employee management practices. Prerequisite: AGR 160.

**AGR 365 Herbaceous Plant Materials (2).** A study of characteristics, requirements, and potential uses of herbaceous ornamental plants in the landscape.

**AGR 366 Horticultural Judging (1).** An emphasis on woody and herbaceous plant morphology, fruit, vegetable, floral and production landscape plant judging. Course geared toward horticultural competitions and training agricultural education majors for FFA competitions. May be repeated for a maximum of two credits. Field trips will be required. Prerequisite: AGR 160 or concurrent enrollment or approval of instructor.

**AGR 367 Residential Landscape Design (3).** The application of principles of design to landscaping the home grounds. The identification, use and maintenance of ornamental plants and lawn grasses. Special attention will be given to the use of native plants for home beautification. Lecture, two hours; laboratory, two hours; field trips. Prerequisites: AGR 263 and 363. (Spring)

**AGR 368 Landscape Construction (3).** Understanding the process of landscape construction from initial planning stages to the actual installation of structures utilized within a landscape design.

**AGR 371 Agricultural Buildings and Construction (3).** Introduction to technical design, selection of materials, and modern construction techniques used in the agriculture industry. Emphasis on concrete and erection of pole frame and steel buildings.

**AGR 372 Agricultural Metal Processes (3).** Basic theories involving metallurgy and the metal working processes. Includes SMAW, GMAW, brazing, OA welding and cutting, and plasma arc process. Skill development emphasized. (Spring)

**AGR 373 Animals in Disaster (2).** This course is two fold. Module A is intended to increase awareness and preparedness among animal owners and care providers. Module B is intended to guide emergency management officials and animal owners, care providers, and industries in preparing community disaster plans. (Fall and Spring)

**AGR 374 Livestock in Disaster (2).** Course is designed to increase your awareness of what livestock producers, emergency managers, veterinarians, extension agents, and others can do to prevent and reduce the consequences of disasters. (Fall and Spring)

**AGR 376 Agricultural Chemicals (3).** This course deals with the major weeds and insects, which attack field crops and stored grain and the associated herbicides and insecticides. An understanding is developed of how and why herbicides function.

**AGR 377 Agriculture Safety (3).** Study of the hazards, methods of injury prevention, safety education, regulations and advancing safety and health in the agriculture industry.

**AGR 378 Agricultural Environmental Management Systems (3).** Study of animal waste, pesticide, and nutrient management practices in agriculture to reduce and control soil and water pollution and comply with Federal and state regulations.

**AGR 379 Field Equipment Technology Management (3).** Course designed to develop a solid foundation of knowledge that can be used to make efficient field equipment technology management decisions and to help keep a farm enterprise competitive.

**AGR 380 veterinary Laboratory Rotation (1).** The student will observe and participate in the daily routing of each laboratory department at Breathitt Veterinary Center including histology, serology, virology, bacteriology, necropsy, toxicology and clinical pathology. Practical experience will be gained and laboratory skills will be applied in a clinical setting. Graded pass/fail.

**AGR 399 Professional Development Seminar I (1).** Seminar for agriculture students focusing on the job search process, employment opportunities, and related problems. Recommended for students in the sophomore or junior year. Graded course.

**AGR 400 veterinary Microbiology (5).** Orientation to the veterinary diagnostic laboratory environment, including familiarization with basic techniques in veterinary bacteriology and mycology, veterinary virology, and clinical serology and immunology. Lecture two hours; laboratory, six hours. Prerequisites: AGR 332, BIO 300, and five hours of chemistry.

**AGR 401 Equine Breeding and Management (3).** A comprehensive study of the reproductive anatomy and physiology of the stallion and brood mare, as well as the care of the foal from birth to weaning. Special attention is given to current management concepts prevalent in the equine industry today. Prerequisite: AGR 302. (Spring)

**AGR 402 Advanced Livestock Judging (3).** Provides the student with guidelines for evaluation and selection procedures as applied to breeding and market swine, beef cattle and sheep. Special emphasis is placed on training students for livestock judging team. May be repeated for a maximum of six credits.

**AGR 403 Equine Reproduction (3).** A comprehensive study of the reproductive anatomy and physiology of the stallion and brood mare, as well as the care of the foal from birth to weaning. Special attention is given to current management concepts prevalent in the equine industry today. Prerequisite: AGR 302.

**AGR 404 Selective Equine Breeding (3).** Study of the hereditary traits in horses, breeding design, performance and progeny testing, marketing, and herd analysis.

**AGR 405 Equine Behavior Modification (3).** Fundamental methods of breaking and training the young horse. All students are assigned a horse for application of techniques. Prerequisites: approval of instructor. (Spring)

**AGR 407 Equine Selection and Evaluation (3).** Basic study of selection and evaluation of horses for various uses, including halter and performance. Prerequisite: AGR 302. (Fall)

**AGR 408 Equine Wilderness Studies (3).** Students will given a broader awareness of the opportunities offered in parks and wilderness areas throughout the United States. Students must be experienced in riding and handling of horses. Students will receive basic instruction concerning the Federal Wilderness Act, its origin and purpose, and various wilderness areas in the United States, their rules and regulations. Students will also study a specific wildness area, its history, flora and fauna, and related items of interest for that particular area. Students will receive instruction in knot tying, packing, and handling a pack string, Dutch oven cooking, and other necessary skills required while working for an outfitter. Classroom instruction will be followed by a working pack trip immediately after finals week in a wilderness area such as the Gila Wilderness Area. While on the pack trip students will be required to keep a journal as part of their grade. Prerequisite: permission of instructor.

**AGR 410 Advanced veterinary Hematology (4).** Concepts of hematopoiesis and the effect of disease on blood cells will be covered. Cell counting, identifications of normal and abnormal blood cells, bone marrow examination, cytology, coagulation, and special hematology skills will be taught. Lecture, two hours; laboratory, four hours. Prerequisites: AGR 332, BIO 300, and five hours of chemistry.

**AGR 420 veterinary Clinical Chemistry (2).** Basic concept of clinical chemistry in animals as it relates to organ systems and specific diseases will be covered in lecture. The laboratory will emphasize clinical chemistry assays utilizing automated and manual techniques as well as urinalysis and use of laboratory equipment. Prerequisites: AGR 332, BIO 300, and five hours of chemistry.

**AGR 430 veterinary Parasitology (2).** Basic concepts of parasitology including life cycles and mechanisms of pathogenicity will be covered during lecture. The laboratory portion will emphasize methods of identification of parasites in fecal, blood, and skin specimens. Lecture, two hours; laboratory, four hours for half a semester. Prerequisites: AGR 332, BIO 300, and five hours of chemistry.

**AGR 433 Farm Management (3).** A study is made of the management functions and economics of farm organization and operation, including input-output relationships, enterprise combination, and budget analysis. Assignments are given which assist the student in applying economics and management principles to an individual case farm operation.

**AGR 435 Interpretation of Agricultural Research (2).** Students will access, analyze, evaluate and interpret agricultural research for occupational work. The course is oriented towards all fields within the agricultural sector.

**AGR 436 undergraduate Research in Agriculture (3-6).** Agricultural research projects arranged individually with faculty members who agree to direct the research. A written plan of research must be filed with the school within two weeks of the beginning of the semester. May be repeated once for a maximum of six hours.



**AGR 438 Seminar in Agricultural Systems (2).** A course designed to enhance students' understanding of and experiences in, agricultural systems. The two emphases that will be available in this seminar are managing a successful agribusiness and production operation. This class is intended for students transferring to MSU through the Transfer Bridge program from the Agricultural Technology Program at KCTCS schools. Seminars and field experience outside of class required. The course may be taken for two credit hours as the agribusiness emphasis or for two credit hours as the production agriculture emphasis. The course can be repeated for a maximum of four hours credit by taking each emphasis.

**AGR 439 Software Applications for Agriculture (3).** A course designed to develop an enhanced understanding of software programs and techniques in a hands-on environment. Software studied will enhance student skills in farm, nutrient and livestock management as well as customer profiling, billing for custom application and technical communication. Prerequisite: AGR 339.

**AGR 440 Behavior Modification Techniques for Domestic Animals (3).** Course is designed to introduce students to techniques of behavior modification and the importance of behavior problem prevention in domestic animals. Basic understanding of normal behavior, principles of learning, and application of various behavior modification techniques will be explored. Prerequisite: AGR 310.

**AGR 441 Principles of Animal Learning (3).** Course designed to introduce students to the fundamentals of how animals learn. Emphasis will be placed on the importance of understanding learning theories. Observing animal behavior will also be a necessary part of this course.

**AGR 444 Purebred Livestock Management and Marketing (3).** A study of the management techniques unique to the purebred livestock industry including, but not limited to, animal selection and development, records, measures of performance and preparation for marketing. In addition, the course will include an in-depth look at advertising and marketing techniques common to the livestock industry. Field hours required. Field trips outside of class time required. Prerequisite: AGR 100.

**AGR 451 veterinary Technology Review (1).** A review course and study guide for credentialing in the area of veterinary technology. Prerequisites: AGR 331, 332, 340, 380, 400, 410, 420, and 430.

**AGR 455 Soil Management (3).** The control of erosion, organic matter maintenance, effects of fertilizer on the environment, evaluating fertility and fertilization of major crops are emphasized. (Spring)

**AGR 460 Professional Experience in Horticulture (3).** Designed to provide on-the-job training in various horticultural enterprises such as golf courses, florist shops, greenhouse operations and garden centers under supervision of a horticulture professor. May be repeated once if approved by faculty advisor. (Fall, Spring or Summer)

**AGR 461 Plant Propagation (3).** A study of the methods of propagating horticultural plants. Includes cutting, grafting, budding, layerage and seed propagation. Lecture, two hours; laboratory, two hours. Prerequisites: AGR 160 and 360.

**AGR 462 Fine Turf Management (3).** A detailed study of varieties of fine turf grasses and establishment and maintenance of fine turf, including soil and turf relationship, fertilizing and liming, and drainage and irrigation. Lecture two hours; laboratory, two hours. Prerequisite: AGR 160.

**AGR 463 Horticultural Therapy (3).** Exploring the therapeutic modality that focuses on improving human health and functioning through the use of horticultural programs. The profession of horticultural therapy is based on medical model and is used both nationally and internationally. This course studies the different client populations that benefit from the therapy and how to set treatment goals based on a client's need.

**AGR 470 Soil and Water Engineering (3).** Surveying, mapping, and determining areas of farm land; designing farm drainage systems; farm ponds; controlling water erosion with terraces and other mechanical structures. Lecture, one hour; laboratory, four hours. (Fall)

**AGR 471 Applications in Precision Agriculture (3).** Designed to understand the acquisition and analysis of geographically referenced data for the management of crop production systems, data formats, geographic information systems, grid sampling, soil fertility and physical properties, herbicide management, combine yield monitoring, variable-rate application, crop modeling and economics. Prerequisite: AGR 339.

**AGR 477 Agricultural Power units (3).** A study of small power units relative to agriculture. Includes servicing, maintenance, repair, use, types and applications of electrical motors, pumps, and small internal combustion engines. (Fall, even years)

**AGR 488 Cooperative Education/Internship (1-3).** A meaningful, planned, and evaluated work experience related to the career and educational objectives of the student for which he/she may receive academic credit and possible financial remuneration. May be repeated for a maximum of six hours from any 488/489 courses. Graded pass/fail. Prerequisite: permission of chair.

**AGR 489 Cooperative Education/Internship (1-3).** A meaningful, planned, and evaluated work experience related to the career and educational objectives of the student for which he/she may receive academic credit and possible financial remuneration. May be repeated for a maximum of six hours from any 488/489 courses. Prerequisite: permission of chair.

**AGR 497 Advanced Practicum in Equine Management (1-12).** This course will allow the student to obtain experience in a pre-approved animal or equine company or organization during the junior or senior year as an undergraduate student. Students will be supervised by a professional at the company or organization, as well as a university coordinator. For each credit taken, a minimum of one week and 40 clocked hours are required. Graded pass/fail. May be repeated for a total of up to 12 hours. Prerequisites: junior or senior status and permission by instructor.

**AGR 498 Agronomy Practicum (12).** Course will allow the student to obtain experience in a pre-approved agronomic company or organization during the senior year as an undergraduate student. Students will be supervised by an agronomist at the company or organization, as well as a university coordinator. Student access to internet and computer equipment capable of online video conferencing is required. This will be a 15-week placement with 525 clock hours required. Graded pass/fail. Students with AGR 488 or 489 credits are not eligible to enroll in this course.

**AGR 499 Leadership/Professional Development Seminar II (1).** Seminar for agriculture students focusing on the leadership development and the transition to the world of work and related problems. Recommended for students in the junior or senior year. Graded course. May be repeated up to three hours.

**AGR 502 Advanced Nutrition (3).** A study of physical and chemical properties of feeds. Digestion, absorption and metabolism of nutrients and factors affecting these functions are emphasized. The nutrient requirements of farm animals and effects of nutrient deficiencies are also studied. (Fall)

**AGR 503 Genetics and Animal Breeding (3).** Study of hereditary traits in livestock, breeding designs, progeny testing and herd analysis. (Spring)

**AGR 504 Diseases of Livestock (3).** Distribution, general nature, methods of dissemination, sanitation, prevention and eradication of common infectious and parasitic diseases of domestic animals; hygiene and preventive medicine, with emphasis on the transmissible diseases. Prerequisites: AGR 100, 300, and 310. (Fall)

**AGR 506 Reproductive Physiology (3).** A study of the reproductive processes in mammals with primary emphasis on domestic farm animals. Will include the anatomy, endocrinology, behavior and general physiology of the reproductive processes. Artificial insemination, estrous control, ova transplants and other practical production practices will be covered. Lecture, two hours; laboratory, two hours. Prerequisites: AGR 100, 300, and 310.

**AGR 510 Animal Anatomy and Physiology (3).** Deals with the anatomy of body systems, how these systems interrelate, and the physiology of body organs. Species covered include porcine, bovine, equine, canine and feline. Prerequisite: AGR 310.

**AGR 511 Animal Anatomy and Physiology Laboratory (2).** Deals with the anatomy of body systems, how these systems interrelate, and the physiology of body organs. Species covered include porcine, bovine, equine, canine and feline. Two hour laboratories twice per week. Prerequisites: AGR 310, 324, and 332. (Spring)

**AGR 512 Beef Cattle Management Systems (3).** A study of beef production, forage management and marketing systems. Lecture, one hour; laboratory, four hours. Prerequisites: AGR 100 and 311. (Fall)

**AGR 514 Teaching Students Horsemanship (3).** Designed for students interested in teaching techniques of teaching horsemanship. Course includes preparation and application of lesson plans. Prerequisite: AGR 304 or 306. (Fall)

**AGR 523 Artificial Insemination Techniques for Cattle (3).** Designed to train students to become competent A.I. technicians. Topics discussed will include reproductive processes, health, nutrition, facilities and management of breeding herd. Techniques concerning semen handling, heat synchronization and heat detection will be taught. Laboratories will be designed to give students actual experience in inseminating cattle. (Summer, with sufficient demand.)

**AGR 529 International Trade and Agriculture (3).** Changing role of U.S. agriculture in a dynamic world economy; national and international policies and institutions affecting agriculture; exchange rates, tariffs, and non-tariff barriers. Prerequisites: junior or senior; AGR 130 or equivalent.

**AGR 530 Advanced Agricultural Prices (3).** Methods of price analysis and forecasting. Index numbers, time series data commodity flows and statistical techniques as applied to price analysis. Special emphasis will be placed upon the use of commodity futures markets in estimating cash prices and in protecting producers from cash price fluctuations. (Fall, even years)

**AGR 531 Agricultural Finance (3).** A study of the needs and problems of financing farm and farm service businesses, including a study of credit institutions serving American agriculture. (Fall)

**AGR 532 Farm and Land Appraisal (3).** A study of the methods and procedures of land and farm property valuation with attention to appraisal programs of the credit and farm service institutions. Prerequisite: AGR 130. (Fall)

**AGR 533 Seminar in International Agriculture Systems (3).** A course designed to enhance student's understanding of international agriculture systems and how they relate to the overall impact on world food processing and production. An emphasis is placed on systems which have the potential to impact and add-value to American agriculture, as well as those which hold key relationships to U.S. based agricultural trade and food development.

**AGR 534 Types and Systems of Farming and Agribusiness (3).** Includes a general statistical analysis of U.S. agriculture with attention to major agricultural regions of the nation and types of farming areas of Kentucky. Special emphasis is given to the organization of West Kentucky and regional farms and agribusinesses. Field trips, interviews and financial analysis of successful firms. (Summer, with sufficient demand.)

**AGR 536 Quantitative Methods for Agribusiness (3).** A study of the use and theory of mathematics as it applies to the fields of agriculture, finance and economics. Attention is given to the elementary uses of algebra, matrix algebra and the calculus as they apply to optimization problems in resource use efficiency. The same mathematics will be applied to time value of money topics. Prerequisites: ECO 230, 231 and MAT 140. (Spring, odd years)

**AGR 537 Seminar in Agricultural Business Systems (2).** Course designed to enhance student's understanding of, and experience in, agricultural business systems. Emphasis will be placed on strategies of managing a successful agribusiness operation and /or farmer-owned cooperatives. Prerequisite: AGR 130.

**AGR 538 Seminar in Production Agricultural Systems (2).** Designed to enhance student's understanding of, and experience in, production agriculture systems and how they relate to a successful farming operation. An emphasis is placed on systems, which have the potential to impact and add-value to the local, regional and national agriculture economy, through classroom as well as laboratory experiences.

**AGR 539 Advanced Computer Applications for Agriculture (3).** An intensive course designed to enhance the computer skills of agriculture students and to give them the skills necessary to generate useful information and solve a variety of agriculturally specific problems. Students receive instruction on advanced word processing concepts, budget generation, statistical analysis, agribusiness related software and global positioning systems in agriculture. Prerequisite: AGR 339.

**AGR 540 veterinary Surgery and Anesthesia (3).** Clinical principles, practices and procedures involved in the field of veterinary medicine. For animal health technology students with senior standing. Prerequisites: AGR 310, 322, 324, and 332.

**AGR 541 Crop Physiology (3).** Basic principles of crop physiology; the effect of environment and management practice on physiological processes, growth and development of crops. (Spring, odd years)

**AGR 542 Plant Breeding I (3).** Basic principles and methods used in the improvement of important agronomic and horticultural crops. (Fall, even years)

**AGR 546 Integrated Pest Management (3).** Principles of plant pest control as related to developmental stages of crop plants. Evaluation of pest problems, alternative control methods and effects on the ecosystem. Emphasis on economic control of insect and disease vectors that affect agricultural crops. (Spring, even years)

**AGR 547 Crop Management (3).** Study of the distribution, economic importance and management of forage, grain crops and tobacco. (Fall)

**AGR 549 Weeds and Their Control (3).** A study of the introduction, methods of dissemination, reproduction and control of weeds by the most reliable methods and techniques. Prerequisite: AGR 160 or 240. (Fall)

**AGR 550 Applied Pharmacology (3).** Advanced clinical principles, practices and procedures in the field of veterinary medicine. Prerequisites: AGR 310, 332, and five hours of chemistry.

**AGR 551 Selected Studies in Agriculture (1-3).** An intensive study of an agriculture topic that will vary from semester to semester. May be repeated to a maximum of six hours. (As demanded)

**AGR 552 Agricultural Policy (3).** The history, principles, setting objectives and means of policy as applied to agriculture in our society. Prerequisite: AGR 130.  
(Spring)

**AGR 554 Soil and Plant Analysis (3).** A study of the chemical and analytical procedures used on soils and plants along with instruction and theory of the use of common analytical equipment. Lecture, one hour; laboratory, four hours. Prerequisite: AGR 345. (Fall)

**AGR 555 Advanced Soil Fertility (3).** The chemistry of the essential elements in soils and the use and the manufacturing processes of various fertilizer materials are considered. Prerequisite: AGR 345. (Spring)

**AGR 560 Advanced veterinary Surgery and Anesthesia (3).** Clinical principles, practices, and procedures involved in Veterinary Surgery and Anesthesia. There are two three hour labs per week. Because of the intensity and types of laboratories offered, there will be additional time required outside of the scheduled class time, for preparation, development of skills, and complete recovery of patients. Outside time will vary depending on particular laboratory.

**AGR 561 Sustainable Agriculture (3).** Course provides an overview of natural resource sustainability in agriculture. It is designed to view the sustainability of food production at farms, community, regional, national and global levels. The topics will cover a variety of biological, ecological, social, cultural and economic topics within the framework of sustainability. Travel to local farms required.

**AGR 562 Principles of Agroecology (3).** This course is designed to cover the basic ecological concepts and the application to agricultural practices and food production systems in the search for the sustainability of human and biological communities within dynamic and varied landscapes.

**AGR 563 Arboriculture (3).** Classification, identification and care of ornamental trees, shrubs and vines, including pruning, bracing, surgery, transplanting, insect and disease control, and fertilization, as related to large areas of organized plantings. Lecture, two hours; laboratory, two hours. Prerequisites: AGR 160, 263, and 363.

**AGR 564 Public Garden Management (3).** An overview of the principles involved with public garden management, plant curatorship, collection care, public education, facility design and long-range planning. Prerequisites: AGR 263, 363, or permission from instructor.

**AGR 565 Public Garden Management Practicum (3).** A hands-on work study course that allows for the management and maintenance of The Arboretum at Murray State and other horticulture components. Prerequisites: AGR 160 and 564 or permission of instructor.

**AGR 566 Advanced Greenhouse Practicum (3).** A study of the principles and practices used in the production of specific important greenhouse crops. Considerable emphasis will be placed on the manipulation of environmental conditions during production. Prerequisite: AGR 360.

**AGR 567 Advanced Landscape Design (3).** The application of design theories, principles and elements to solve landscape design objectives and concerns for residential properties. Attention will be given to site analyses, client concerns, client relationships and contractual agreements while completing the design process. Prerequisites: Grade of C or better in AGR 263, 363, 365, 367 or permission of instructor.

**AGR 569 Interior Plantscaping (2).** A study of the basic plants used for interior design and decoration. This study includes identification, nomenclature, growing requirements, insect and disease problems and proper use of these plants in interiors.

**AGR 570 AG Systems Technology Lab Management (3).** This course is a study of theories involving agricultural mechanization and systems technology. Emphasis is placed on understanding the technology involved in operating, maintaining and managing power and machinery, electricity, precision agriculture, soil and water engineering, metallurgy and fabrication, and safety systems. Skill development emphasized. Prerequisite: AGR 170. (Fall)

**AGR 571 Advanced Precision Agriculture (3).** Designed for students who desire to apply and expand knowledge of the acquisition and analysis of geographically referenced data for the management of crop production systems, data formats, geographic information systems, grid sampling, soil fertility and physical properties, herbicide management, yield monitoring, variable-rate application, crop modeling and economics.

**AGR 572 Advanced Metal Work (3).** Application of the principles of arc, MIG, TIG and oxyacetylene welding in design. Primarily for vocational agricultural teachers. Application of the principles of electric and oxyacetylene welding in design and construction of agricultural projects. (Spring, odd years)

**AGR 573 Agricultural Processing Systems (3).** An analysis of systems and methods for harvesting, processing and storing agricultural products. Includes drying and curing principles, grinding, mixing, cleaning, sorting, material handling and structural environmental design. (Fall, even years)

**AGR 574 Agricultural Irrigation and Water Systems (3).** Includes determining water needs, water sources, pumps, fundamental pipeline hydraulics and designing a complete irrigation and/or water system for the farm. (Spring, even years)

**AGR 575 Combine and Grain Handling Systems (3).** Developing a complete grain harvesting, handling, drying and storage operation. A study of combine operation and the materials flow concept, closed loop handling, psychrometrics, grain drying, drying methods, facility layout and facility management. Combine comparison, selection and utilization.

**AGR 576 Agricultural Electrification Systems (3).** Study of the basic principles of electricity, the fundamentals of wiring and selection, the operation and economics of agricultural electricity equipment. (Spring)

**AGR 577 Tractor Power Principles (3).** Study of the principles governing the selection and application of tractors and power driven machines. Emphasis is placed on operating systems of engines, including compression, ignition and carburetion. Mechanical principles of tractors and preventive maintenance included. (Fall, odd years)

**AGR 578 Research and Development of Agriculture Tractors and Equipment (3).** Tours of the major agriculture tractor and equipment industries. The tours include: research and development, engineering, foundries, and the assembly of engines, transmissions, final drives, combines, cotton pickers, and planting equipment. (Summer)

**AGR 580 veterinary Products (3).** This course deals with old and new products currently available in the veterinary market. Market will include the ordering and purchasing of wholesale products, selling, inventory control, computer programming, marketing, and pricing of products utilized in a veterinary practice.

**AGR 582 veterinary Practice and operations (3).** Course will deal with the day to day events centered around the operation of a veterinary practice. Supervisory skills, communication skills, inventory, bookkeeping, planning, and advertising are the main areas stressed in this course.

**AGR 583 veterinary Law and Ethics (3).** Course deals with law and ethics in the veterinary profession. The course will include a basic understanding of law, professional liability, legality of veterinary drugs, ethics and how they pertain to the treatment of animals, and medical records.

**AGR 585 Specialized Journalism/RTv (1-3).** Directed individual study. Can be a journalistic effort in areas such as science, sports, government, religion, graphics, etc., or a project in radio or television such as a major production or series, an extensive research project and paper, or other approved project. Prerequisites: permission of instructor and written approved proposal required prior to registration.

**AGR 590 Internship in Animal Technology (3-6).** Practical full-time work experience to be arranged through an animal-related facility during the fall, spring or summer session. Site to be arranged by the student and approved by the course coordinator. May be repeated for a total of six credit hours. Prerequisites: AGR 100, 300, 331, 332, 340, 351 and 400. Enrollment only by permission of instructor. (Fall, Spring or Summer)

**AGR 599 Agriculture Senior Capstone (1).** This is a senior capstone course culminating in students demonstrating general knowledge in the agriculture core curricula, demonstrating completed knowledge in the student's chosen option within agriculture science, and a lecture series from influential agriculture leaders. Students will also have an opportunity to share insight into the direction and future of the Hutson School of Agriculture by sharing comments on educational effectiveness. Prerequisites: All agriculture science core classes and option classes must be completed with passing grades in the Hutson School of Agriculture. Refer to the Department of Agriculture Science for a complete list of core and respective options courses.