

Agriculture Building Room 206
 Telephone: 512-245-2130
www.ag.txstate.edu (<http://www.ag.txstate.edu/>)

Agricultural Sciences majors have a choice of three different degree tracks:

- Agriculture,
- Animal Science,
- Agricultural Business and Management.

The Department of Agricultural Sciences offers programs reflecting the diversity of choices available and skills required in modern agriculture and its related professions. This dynamic, global industry uses new technologies to improve the production, management, manufacture, and distribution of food and agricultural products.

Major in Agriculture

Agriculture majors provide a broad exposure to agricultural disciplines. With this curriculum, students may expect to manage a ranch or a farm, or work in any career that requires a general agriculture education such as county extension agents, banking or government service. Students in this major may pursue the following concentrations/certifications:

- Horticulture Concentration. This concentration teaches management of commercial establishments and institutions that produce ornamental plants such as greenhouses and nurseries, floral shops and plant therapy businesses. The major also contains specialized courses in horticulture that utilize greenhouses, the Freeman Center and the Living Library Gardens.
- Regenerative Agriculture Concentrations: The Department offers three concentrations on Regenerative Agriculture, focusing on i) Agronomy and Crop Science, ii) Range Management, and iii) Soil Science and Soil Conservation. These concentrations train students in the science of how to understand the complex system of soil and plant interactions, and how to maintain healthy soils that can regenerate nutrient quality and sequester carbon. They provide students with education in crops/range plants and their relationships to healthy soils and the environment. Students will be prepared for professional positions with federal and state agencies, and private businesses dedicated to sustainable crop production, preserving and improving range conditions or preserving and improving soil health.
- Agricultural Mechanics Concentration. This concentration offers one of the most popular agricultural pathways offered at the secondary level in the state of Texas. The junior agricultural mechanics shows at the major livestock shows and rodeos in Texas are also some of the most well attended events among secondary agriculture students.
- Teacher Certification in Agriculture, Food and Natural Resources. A comprehensive educational program concerned with the broad field of agriculture. Emphasis in the major is on production techniques, managerial skills and competencies necessary to function as agricultural scientists, educators, or agricultural managers in today's complex agricultural industry. Agriculture teachers are certified to teach in grades six through twelve in the public schools of Texas.

Major in Animal Science

The study of all aspects of the livestock and poultry industries including commercial production and management; food processing; and animal

feed/animal health including nutrition, biotechnology and veterinary medicine. Involvement of students in ongoing faculty research prepares graduates for careers in research and industry; and for further education in veterinary schools or graduate schools. Students may pursue a Pre-Veterinary concentration with this major. The Pre-Veterinary concentration provides specialized course work required for students planning to enter veterinary school.

Major in Agricultural Business and Management

This major reaches far beyond the farm to encompass the activities involved in bringing food and fiber to consumers. The degree prepares students to be competent in agribusiness management, agricultural marketing in domestic and international trade, food safety, sustainability, and agricultural and natural resource policy.

Internship

Students are encouraged to apply for internships and enroll in AG 4310 (<http://mycatalog.txstate.edu/search/?P=AG%204310>) after their junior year. Students will identify a faculty member to facilitate their experience and request permission for enrollment in the internship course. Students are required to have a 3.00 overall GPA. The department will assist students in securing internships in agriculturally related businesses or agencies.

Minors

The Department of Agricultural Sciences offers five undergraduate minors (Agricultural Mechanics, Agriculture, Animal Science, Horticulture, and Plant and Soil Sciences). Students with a declared major within the Department of Agricultural Sciences require at least nine (9) unique hours to select a minor in another agriculture subject.

Bachelor of Science in Agriculture (B.S.A.G.)

- Major in Agriculture (<http://mycatalog.txstate.edu/undergraduate/science-engineering/agriculturalsciences/agriculture-bsag/>)
- Major in Agriculture (Agricultural Mechanics Concentration) (<http://mycatalog.txstate.edu/undergraduate/science-engineering/agriculturalsciences/agriculture-agricultural-mechanics-concentration/>)
- Major in Agriculture (Horticulture Concentration) (<http://mycatalog.txstate.edu/undergraduate/science-engineering/agriculturalsciences/agriculture-agricultural-horticulture-concentration/>)
- Major in Agriculture (Teacher Certification in Agriculture, Food and Natural Resources, Grades 6-12) (<http://mycatalog.txstate.edu/undergraduate/science-engineering/agriculturalsciences/agriculture-teacher-certification-science-technology-grades-612-bsag/>)
- Major in Agriculture (Regenerative Agriculture - Agronomy and Crop Science Concentration) (<http://mycatalog.txstate.edu/undergraduate/science-engineering/agriculturalsciences/agriculture-regenerative-agronomy-crop-concentration-bsag/>)
- Major in Agriculture (Regenerative Agriculture - Range Management Concentration) (<http://mycatalog.txstate.edu/undergraduate/science-engineering/agriculturalsciences/agriculture-regenerative-range-management-concentration-bsag/>)
- Major in Agriculture (Regenerative Agriculture - Soil Science and Soil Conservation Concentration) (<http://mycatalog.txstate.edu/>)

undergraduate/science-engineering/agriculturalsciences/agriculture-regenerative-soil-science-soil-conservation-concentration-bsag/)

- Major in Animal Science (<http://mycatalog.txstate.edu/undergraduate/science-engineering/agriculturalsciences/agriculture-animal-science/>)
- Major in Animal Science (Pre-Veterinary Concentration) (<http://mycatalog.txstate.edu/undergraduate/science-engineering/agriculturalsciences/agriculture-animal-science-preveterinary-concentration/>)
- Major in Agricultural Business and Management (<http://mycatalog.txstate.edu/undergraduate/science-engineering/agriculturalsciences/agriculture-business-management-agribusiness-specialization-bsag/>)

Minors

- Agriculture (<http://mycatalog.txstate.edu/undergraduate/science-engineering/agriculturalsciences/agriculture-minor/>)
- Agricultural Mechanics (<http://mycatalog.txstate.edu/undergraduate/science-engineering/agriculturalsciences/-agricultural-mechanics-minor/>)
- Animal Science (<http://mycatalog.txstate.edu/undergraduate/science-engineering/agriculturalsciences/animal-science-minor/>)
- Horticulture (<http://mycatalog.txstate.edu/undergraduate/science-engineering/agriculturalsciences/horticulture-minor/>)
- Plant and Soil Science (<http://mycatalog.txstate.edu/undergraduate/science-engineering/agriculturalsciences/plant-soil-science-minor/>)
- Second Teaching Field in Agriculture, Food and Natural Resources (Grades 6-12)

Courses in Agriculture (AG)

AG 1101. Basic Animal Science Laboratory.

This course introduces students to basic animal science laboratory content. Students will be required to handle livestock and complete occupational health and safety program requirements. This is an introductory laboratory designed to provide students with demonstrations and applied examples related to the study of domestic livestock and poultry animals. This laboratory includes genetics, management/handling, nutrition, and reproduction aspects. This course is not recommended for students who are not majoring in a science discipline.

1 Credit Hour. 0 Lecture Contact Hours. 2 Lab Contact Hours.

Grade Mode: Standard Letter

TCCN: AGRI 1119

AG 1110. Careers in Agriculture.

This course is an introduction to careers available in the broad field of agriculture including an overview of personal and career qualifications needed for workplace success.

1 Credit Hour. 1 Lecture Contact Hour. 0 Lab Contact Hours.

Course Attribute(s): Dif Tui- Science & Engineering

Grade Mode: Standard Letter

TCCN: AGRI 1131

AG 1301. Basic Animal Science.

This course is an introductory course designed to provide students with knowledge about the importance and structure of the livestock and poultry industries in the United States. This course includes study of domestic livestock and poultry animals with emphases on breeding, husbandry, genetics, management, nutrition, and reproduction. Basic anatomy and physiology of livestock and poultry will also be covered. This course is not recommended for students who are not majoring in a science discipline.

3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.

Grade Mode: Standard Letter

TCCN: AGRI 1319

AG 2101. Crop Science Laboratory.

This course introduces the students to laboratory related topics in crop production. Laboratory exercises include basic activities related to crop physiology and structures, fertility, insect and microbial pests, basic soil principles and management, and introductory crop breeding and genetics.

1 Credit Hour. 0 Lecture Contact Hours. 2 Lab Contact Hours.

Grade Mode: Standard Letter

TCCN: AGRI 1107

AG 2275. Agricultural Safety.

This course covers the fundamentals of hazards, methods of injury prevention, safety education, regulations and advancing safety and health in the agriculture industry. This course will identify potential industrial hazards and means to mitigate these hazards and develop a culture of safety within an organization.

2 Credit Hours. 2 Lecture Contact Hours. 0 Lab Contact Hours.

Course Attribute(s): Dif Tui- Science & Engineering

Grade Mode: Standard Letter

AG 2301. Crop Science.

This course introduces students to structural morphology and physiology of crop plants, their genetics and breeding, domestication, production methods, and general soil conditions. It also covers the study of crop production, harvest practices, storage, and use of cereal and feed grains, fiber crops, forages, modern cropping and other related crops requiring special technology.

3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.

Grade Mode: Standard Letter

TCCN: AGRI 1307

AG 2318. Anatomy and Physiology of Livestock and Poultry.

This course provides a fundamental knowledge of major anatomical and physiological features of the skeletal, muscular, endocrine, cardiovascular, urinary, respiratory, and nervous systems of various livestock species. Gross and microanatomy of livestock and poultry will also be covered. Prerequisite: AG 1301 with a grade of a "C" or better.

3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.

Course Attribute(s): Dif Tui- Science & Engineering

Grade Mode: Standard Letter

AG 2373. Introduction to Agricultural Engineering.

An introductory course designed to acquaint students with a wide range of concepts, principles and applied technologies in agricultural engineering. A problem solving course.

3 Credit Hours. 2 Lecture Contact Hours. 2 Lab Contact Hours.

Course Attribute(s): Dif Tui- Science & Engineering|Lab Required

Grade Mode: Standard Letter

TCCN: AGRI 2303

AG 2374. Metal Fabrication and Welding Technology for Agriculture.

This course covers the principles and practices of applied metallurgy and welding. Emphasis is given to the management of the technologies and techniques associated with oxy-fuel cutting, shielded metal arc welding (SMAW), Gas Metal Arc Welding (GMAW), Gas Tungsten Arc Welding (GTAW), and Plasma Arc Cutting (PAC). Prerequisite: AG 2373 with a grade of "C" or better.

3 Credit Hours. 2 Lecture Contact Hours. 2 Lab Contact Hours.

Course Attribute(s): Dif Tui- Science & Engineering|Lab Required

Grade Mode: Standard Letter

AG 2379. General Horticulture.

A survey of the general field of horticulture including general areas of employment.

3 Credit Hours. 2 Lecture Contact Hours. 2 Lab Contact Hours.

Course Attribute(s): Dif Tui- Science & Engineering|Lab Required

Grade Mode: Standard Letter

TCCN: AGRI 1315

AG 2383. Introduction to Agricultural Economics.

The role of agriculture in the general economy; the study of basic economic concepts with their application to the agricultural firm; the structure and operation of the marketing system; the functional and institutional aspects of agricultural finance; international trade; and government farm programs.

3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.

Course Attribute(s): Dif Tui- Science & Engineering|Multicultural Content

Grade Mode: Standard Letter

TCCN: AGRI 2317

AG 2390. Computer Applications in Agriculture.

Introduction to computers and computer technology; operation and application of the computer in production agriculture and agricultural business, services and industries. Includes characteristics of computer hardware and software, accessing and using the computer in agriculture.

3 Credit Hours. 2 Lecture Contact Hours. 2 Lab Contact Hours.

Course Attribute(s): Dif Tui- Science & Engineering|Lab Required

Grade Mode: Standard Letter

TCCN: AGRI 1309

AG 2391. Livestock Behavior and Welfare.

This course provides foundational knowledge on how livestock behave.

It also provides the knowledge of how to handle livestock humanely.

Livestock stress and physiological response to human interaction will also be discussed. Prerequisite: AG 1445 and [BIO 1330 and BIO 1130] all with grades of "C" or better.

3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.

Course Attribute(s): Dif Tui- Science & Engineering

Grade Mode: Standard Letter

AG 3121. Holistic Range Management Laboratory.

This course provides students with hands on field experience in range management. It will include site visits to ranches that practice conventional, adaptive, mob or holistic grazing. Students will be able to conduct range assessments of plant diversity, soil health and animal condition. May include Saturday travel. Prerequisite: AG 1301 with a grade of "C" or better. Corequisite: AG 3321 with a grade of "C" or better.

1 Credit Hour. 0 Lecture Contact Hours. 3 Lab Contact Hours.

Grade Mode: Standard Letter

AG 3300. Undergraduate Research in Agricultural Sciences.

This course introduces students to the fundamentals of scientific inquiry in agriculture. Topics include quantitative and qualitative research methods, data management, data analysis, data interpretation, and data dissemination, with emphasis on their applications in agriculture.

Prerequisite: A minimum 3.0 Overall GPA.

3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.

Course Attribute(s): Dif Tui- Science & Engineering

Grade Mode: Standard Letter

AG 3301. Principles of Livestock Genetics.

This course focuses on the fundamental principles of genetics and their application to animals. The physical basis of Mendelian inheritance, expression and interaction of genes, gene frequency, linkage, sex linkage, inbreeding, line breeding, and crossbreeding as applied to selection indices for livestock are examined. (WI) Prerequisite: AG 2318 and BIO 1130 and BIO 1330 all with grades of "C" or better.

3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.

Course Attribute(s): Dif Tui- Science & Engineering|Writing Intensive

Grade Mode: Standard Letter

AG 3302. Herbaceous Plant Materials.

This course will include the identification, selection, use, and management of annuals, perennials, herbs, and ornamental grasses in the landscape. Each student will learn irrigation, fertilization, pruning, and other cultural needs of such plants. The laboratory will complement lecture.

3 Credit Hours. 2 Lecture Contact Hours. 2 Lab Contact Hours.

Course Attribute(s): Dif Tui- Science & Engineering|Lab Required

Grade Mode: Standard Letter

AG 3304. Propagation of Horticultural Plants.

Principles and practices of propagating ornamental plants, vegetables, and fruits by sexual and asexual methods including germination of seed, layerage, graftage, division, cuttage, bulbs, corms, and other vegetative plant structures. Study of physical, physiological and environmental factors affecting propagation of ornamental plants.

3 Credit Hours. 2 Lecture Contact Hours. 2 Lab Contact Hours.

Course Attribute(s): Dif Tui- Science & Engineering|Lab Required

Grade Mode: Standard Letter

AG 3305. Woody Plant Materials for Outdoor Landscapes.

Study of woody plant material including fruit and ornamental trees, shrubs, and ground covers and their identification, nomenclature, and use in the planting and development of home landscapes.

3 Credit Hours. 2 Lecture Contact Hours. 2 Lab Contact Hours.

Course Attribute(s): Dif Tui- Science & Engineering|Lab Required

Grade Mode: Standard Letter

AG 3306. Flowers and Plants for Interior Design.

Study of flowers, cut flowers, foliage and blooming pot plants to enhance the interior design of homes and businesses including their identification, cultural requirements, uses, diagnoses and corrective measures of disorders. Basic principles of flower arrangement and the preparation of floral and plant decoration as used in interior design. (WI).

3 Credit Hours. 2 Lecture Contact Hours. 2 Lab Contact Hours.

Course Attribute(s): Dif Tui- Science & Engineering|Lab Required|Writing Intensive

Grade Mode: Standard Letter

AG 3308. Organic Gardening.

This course introduces the principles and practices of basic gardening using organic methods. Topics include an overview of soil preparation, warm and cool season crops, propagation of plants, and weed, insect, and disease identification and management.

3 Credit Hours. 2 Lecture Contact Hours. 2 Lab Contact Hours.

Course Attribute(s): Dif Tui- Science & Engineering

Grade Mode: Standard Letter

AG 3310. Agriculture Power and Machinery Technology.

This course covers the principles of 2 stroke and 4-stroke cycle engines, ignition, and combustion types including injection systems. Components including power and power transmissions and hydraulic systems will also be addressed. Prerequisites: AG 2373 with a grade of "C" or better and [MATH 1315 or MATH 1319 or MATH 2321 or MATH 2417 or MATH 2471] with grades of "D" or better.

3 Credit Hours. 2 Lecture Contact Hours. 2 Lab Contact Hours.

Course Attribute(s): Dif Tui- Science & Engineering|Lab Required

Grade Mode: Standard Letter

AG 3314. Animal Health and Disease Control.

This course is designed to introduce immunology and provide a basic understanding of veterinary principles as applied to prevention and treatment of domestic livestock diseases. Common diseases of livestock are considered, with emphasis on immune function, symptoms, prevention, and treatment. Prerequisite: AG 2318 and BIO 1330 and BIO 1130 all with a grade of "C" or better.

3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.

Course Attribute(s): Dif Tui- Science & Engineering

Grade Mode: Standard Letter

AG 3317. Ranch and Farm Management.

This course introduces tools and techniques which are basic to the study of farm and ranch organization and decision making, the wise allocation of factors of production, the keeping of records, and income tax management. Prerequisites: AG 2383 and AG 2390 and [MATH 1315 or MATH 1319 or MATH 2321 or MATH 2417 or MATH 2471] all with grades of "D" or better.

3 Credit Hours. 2 Lecture Contact Hours. 2 Lab Contact Hours.

Course Attribute(s): Dif Tui- Science & Engineering|Lab Required

Grade Mode: Standard Letter

AG 3318. Agricultural Business Management.

This course introduces institutions and functions of agribusiness. The institutional structure of agribusiness such as feed, farm machinery and equipment, farm chemicals, financial institutions and private and public agri-services will be delineated. Various agribusiness functions such as organizational behavior and financial, market and human resource management will be discussed. Prerequisite: AG 2383 and AG 2390 and [MATH 1315 or MATH 1319 or MATH 2321 or MATH 2417 or MATH 2471] all with grades of "D" or better.

3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.

Course Attribute(s): Dif Tui- Science & Engineering

Grade Mode: Standard Letter

AG 3319. International Food and Fiber Systems.

This course presents the food and fiber system from an international perspective. Analysis of food production and consumption patterns under different world economic systems, causes of surpluses and shortages throughout the world; the role of trade in solving food and agricultural problems. Global outlook and situation for food and fiber. (MULT).

3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.

Course Attribute(s): Dif Tui- Science & Engineering|Multicultural Content

Grade Mode: Standard Letter

AG 3321. Holistic Range Management.

This course discusses the practical problems in managing native pastures and rangelands. Attention to determining the holistic range condition, measuring forage availability and assessing soil health will be discussed. Specifically, how to regenerate over grazed pastures and determine ecological successional stages, as well as ecological and physiological response of range vegetation to grazing. Other topics covered will include methods of handling livestock on the range, range reseeding, brush control, and poisonous plants. Prerequisite: AG 1301 with a grade of "C" or better.

3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.

Course Attribute(s): Dif Tui- Science & Engineering

Grade Mode: Standard Letter

AG 3325. Animal Nutrition.

This course addresses the principles of animal nutrition with emphasis on digestion, absorption, metabolism, and function of nutrients. Also covered are the estimation of the feed source nutritive value, the animal nutritional requirements and the impact on animal growth and function. Prerequisite: AG 1301 and BIO 1330 and CHEM 1341 all with grades of "C" or better.

3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.

Course Attribute(s): Dif Tui- Science & Engineering

Grade Mode: Standard Letter

AG 3329. Economic Entomology.

A study of the most common insects of field crops, fruits, and vegetables; life history, methods of attack, damage, and means of preventing and controlling. Collection and mounts of insects will be made.

3 Credit Hours. 2 Lecture Contact Hours. 2 Lab Contact Hours.

Course Attribute(s): Dif Tui- Science & Engineering|Lab Required

Grade Mode: Standard Letter

AG 3330. Applied Wildlife Nutrition.

Basic and fundamental principles of nutrition for ruminant and non-ruminant wildlife with emphasis in North American and African wildlife. Attention will be given to digestive physiology and anatomy, feed sources, forage resources, and nutrient requirements. Prerequisite: AG 1301 and BIO 1330 with grades of "C" or better.

3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.

Course Attribute(s): Dif Tui- Science & Engineering

Grade Mode: Standard Letter

AG 3331. Reproduction in Farm Animals.

This course is an examination of the anatomy and physiology of reproductive systems of livestock of economic importance. Attention is given to reproductive failure and disease. The laboratory includes pregnancy testing, semen collection and evaluation, artificial insemination techniques, and evaluation of breeding records. Prerequisites: AG 2318 and [AG 3301 or BIO 2450] all with grades of "C" or better.

3 Credit Hours. 2 Lecture Contact Hours. 2 Lab Contact Hours.

Course Attribute(s): Dif Tui- Science & Engineering|Lab Required

Grade Mode: Standard Letter

AG 3341. Leadership Development in Agricultural Sciences.

This course focuses on the foundations of leadership concepts and theories useful in agricultural careers of science, government agency, non-profits and business. Emphasis is placed on the development of individual leadership skills, group situations, and strategies necessary for effective leadership."

3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.

Course Attribute(s): Dif Tui- Science & Engineering|Multicultural Perspective

Grade Mode: Standard Letter

AG 3345. Livestock Selection and Evaluation.

This course is a detailed consideration of the factors involved in the selection and evaluation of beef cattle, sheep, swine, rabbits, goats, and chickens. Emphasis will be placed on the care, grooming and exhibition of livestock projects. Prerequisite: AG 1301 with a grade of "C" or better.

3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.

Course Attribute(s): Dif Tui- Science & Engineering

Grade Mode: Standard Letter

AG 3346. Equine Management.

This course provides an in-depth study of domestic equine care, handling, and facility management. Topics include equine nutrition, health maintenance, reproduction, behavior, and training principles. Students will gain practical experience in stable operations, herd management, and industry best practices through laboratory instruction. Prerequisite: AG 1301 with a grade of "C" or better.

3 Credit Hours. 2 Lecture Contact Hours. 2 Lab Contact Hours.

Grade Mode: Standard Letter

AG 3350. Intermediate Microeconomics and Agricultural Application.

This course focuses on intermediate-level microeconomics and its application in agriculture. The course covers topics such as consumer and producer theories, game theory, labor and capital markets, uncertainty, externalities, and public goods. Prerequisite: AG 2383 and [MATH 1315 or MATH 1319 or MATH 2321 or MATH 2417 or MATH 2471] both with grades of "D" or better.

3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.

Course Attribute(s): Dif Tui- Science & Engineering

Grade Mode: Standard Letter

AG 3351. Agricultural Marketing and Sales.

A study of the food marketing system and farm input sales; includes the functional systems approach that integrates the agricultural input industries into a discussion of food marketing; takes a micro approach to the development of marketing management skills needed in agribusiness; and provides a critical outlook on issues ranging from inputs to final food products. (WI) Prerequisite: AG 2383 and [MATH 1315 or MATH 1319 or MATH 2321 or MATH 2417 or MATH 2471] both with grades of "D" or better.

3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.

Course Attribute(s): Dif Tui- Science & Engineering|Writing Intensive

Grade Mode: Standard Letter

AG 3352. Quantitative Methods in Agricultural Economics.

Principles involved in collection, tabulating and analyzing agricultural data. Topics include sampling procedures, questionnaire development, descriptive analysis of data, correlation, prediction and forecasting and tests of significance. Simple computer programs will be stressed for class exercises during the course. Prerequisite: MATH 1315 or MATH 1319 or MATH 2321 or MATH 2417 or MATH 2471 any with a grade of "D" or better.

3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.

Course Attribute(s): Dif Tui- Science & Engineering|Lab Required

Grade Mode: Standard Letter

AG 3353. Agricultural Structures and Environment.

This course introduces principles and practices associated with structural components, selection, materials of construction, heat and moisture control, and the environmental issues of waste management systems; a problem solving course. Prerequisites: AG 2373 with grade of "C" or better and [MATH 1315 or MATH 1319 or MATH 2321 or MATH 2417 or MATH 2471] with grades of "D" or better.

3 Credit Hours. 2 Lecture Contact Hours. 2 Lab Contact Hours.

Course Attribute(s): Dif Tui- Science & Engineering|Lab Required

Grade Mode: Standard Letter

AG 3355. International Agricultural Trade.

This course focuses on economic forces associated with trade in food and agricultural products between the United States and other countries. The course covers gains from trade, agricultural trade policies (of exporters and importers), exchange rates, and multilateral trade negotiations. The course also explains how economic principles and analytical techniques are applied to international trade and multi-national markets of agricultural products. Prerequisite: AG 2383 and ECO 2315 and [MATH 1315 or MATH 1319 or MATH 2321 or MATH 2328 or MATH 2417 or MATH 2471] all with a grade of "D" or better.

3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.

Course Attribute(s): Dif Tui- Science & Engineering

Grade Mode: Standard Letter

AG 3367. Livestock Ultrasonography.

This course provides students with the current developments and utilization of ultrasound technology in the livestock industry. Emphasis will be placed on understanding the functionality of an ultrasound machine and the use of ultrasonography in live animal carcass evaluation as well as reproductive techniques including pregnancy determination, fetal sexing, and fetal aging. Prerequisite: AG 1301 with a grade of "C" or better.

3 Credit Hours. 2 Lecture Contact Hours. 2 Lab Contact Hours.

Course Attribute(s): Dif Tui- Science & Engineering

Grade Mode: Standard Letter

AG 3375. Management of Agricultural Machinery and Equipment.

This course addresses the optimization of the equipment phases of agricultural production and processing. Emphasis will be placed on management and decision making principles concerned with the efficient selection, operation, repair, maintenance, and replacement of machinery and equipment. Prerequisites: AG 2373 with grade of "C" or better and CHEM 1341 and CHEM 1141 and [MATH 1315 or MATH 1319 or MATH 2321 or MATH 2417 or MATH 2471] all with grades of "D" or better.

3 Credit Hours. 2 Lecture Contact Hours. 2 Lab Contact Hours.

Course Attribute(s): Dif Tui- Science & Engineering|Lab Required

Grade Mode: Standard Letter

AG 3381. Beef Cattle Production.

This course provides students with practical application in the principles of breeding, feeding, and management of commercial and purebred cattle. Students receive first-hand experience and knowledge of breeding techniques, animal handling, genetic selection, nutrition application, marketing, and technology. Prerequisite: AG 3325 with a grade of "C" or better.

3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.

Course Attribute(s): Dif Tui- Science & Engineering

Grade Mode: Standard Letter

AG 3382. Meat and Muscle Biology.

This course offers a comprehensive introduction to the foundational principles of meat science, focusing on muscle structure, biochemistry, meat quality, processing, composition, and economics. Students will understand factors influencing producers, processors, and consumers. The course will discuss carcass anatomy, primal cuts, and retail cuts and will assess various elements that determine the value of meat animals and their corresponding cuts. Furthermore, the curriculum will provide insight into United States Department of Agriculture (USDA) grading standards for beef, pork, and lamb. Prerequisite: AG 1301 and BIO 1130 and BIO 1330 and CHEM 1141, and CHEM 1341 all with grades of "C" or better.

3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.

Grade Mode: Standard Letter

AG 3391. Livestock Behavior and Welfare.

This course provides foundational knowledge on how livestock behave. It also provides knowledge on how to handle livestock humanely. Livestock stress and physiological response to human interaction will also be discussed. Prerequisite: AG 1301 and BIO 1330 with grades of "C" or better.

3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.

Grade Mode: Standard Letter

AG 3426. Soil Pedology, Physics and Chemistry.

This course introduces students to the fundamental principles of soil science to acquaint the student with the origins, biology, physical and chemical properties of the soil. Prerequisites: [AG 2301 and AG 2101 or AG 2379] and AG 1301 with grades of "C" or better and CHEM 1141 and CHEM 1341 and BIO 1330 all with grades of "D" or better.

4 Credit Hours. 3 Lecture Contact Hours. 3 Lab Contact Hours.

Course Attribute(s): Dif Tui- Science & Engineering|Lab Required

Grade Mode: Standard Letter

AG 3427. Soil Fertility, Health and Regenerative Practices.

This course provides students with knowledge of soil regeneration, fertility relationships, the principles of soil health and the management of soils in the environment. Special emphasis is given to the role of soil in regenerative agricultural systems, ecological cycles, nutrient cycles, and natural resource systems. (WI) Prerequisite: AG 3426 with a grade of "D" or better.

4 Credit Hours. 3 Lecture Contact Hours. 3 Lab Contact Hours.

Course Attribute(s): Dif Tui- Science & Engineering|Lab Required|Writing Intensive

Grade Mode: Standard Letter

AG 3429. Integrated Pest Management.

This course introduces students to the importance of pest management in the agricultural environment. The course primarily focuses on insect pests and includes regenerative and conventional practices. Students will learn how insects are monitored, life histories used for management, phenology, and relationships to crops, along with control methods with emphasis on pollinator crops and natural enemies. Students will also create an insect collection and learn insect identification. Prerequisite: [AG 2301 or AG 2379 or AG 1301] with a grade of "C or better" and BIO 1130 and BIO 1330 with a grade of "D" or better.

4 Credit Hours. 3 Lecture Contact Hours. 2 Lab Contact Hours.

Grade Mode: Standard Letter

AG 4113. Summer Programs in Agricultural Education.

This course provides students field experience in summer agricultural education programming in secondary school settings. Students will receive individualized instruction during supervised visits while they are engaged in their field experience. The course includes program planning and educating diverse student learning populations. Prerequisite: AG 4212 with a grade of "C" or better.

1 Credit Hour. 2 Lecture Contact Hours. 0 Lab Contact Hours.

Course Attribute(s): Dif Tui- Science & Engineering

Grade Mode: Standard Letter

AG 4185. Independent Study.

This course provides advanced undergraduates with opportunities to study any subject matter of special interest in agricultural Sciences. May be repeated two times. (WI) Prerequisite: Department approval and a minimum 3.0 Texas State GPA.

1 Credit Hour. 1 Lecture Contact Hour. 0 Lab Contact Hours.

Course Attribute(s): Exclude from 3-peat Processing|Dif Tui- Science & Engineering|Dual Enrollment Permitted|Writing Intensive

Grade Mode: Standard Letter

AG 4212. Program Building.

This course focuses on program and curriculum development in agricultural education settings. Primary course elements will include determining program and curriculum goals and objectives, implementing the program, and curriculum evaluation. Corequisite: AG 4343 with a grade of "D" or better.

2 Credit Hours. 2 Lecture Contact Hours. 0 Lab Contact Hours.

Course Attribute(s): Dif Tui- Science & Engineering

Grade Mode: Standard Letter

AG 4300. Greenhouse and Nursery Management.

Planning greenhouses for commercial and home use; plant-nursery layouts. Study of the physical and economic factors affecting the production of plants in the greenhouse and other forcing structures, and in the field; management techniques used in the production and marketing of greenhouse and nursery plants. (WI).

3 Credit Hours. 2 Lecture Contact Hours. 2 Lab Contact Hours.

Course Attribute(s): Dif Tui- Science & Engineering|Lab Required|Writing Intensive

Grade Mode: Standard Letter

AG 4302. Fruit and Vegetable Crop Production.

Factors influencing small-fruit and tree-fruit and vegetable crop production in the field including root stocks, varieties, soil, planting, transplanting, irrigating, fertilizing, pruning, insects, diseases, nematodes, weeds, chemicals, harvesting, storing, and marketing; greenhouse production of certain vegetables. (WI) Prerequisite: AG 2313 or AG 2379 either with a grade of "D" or better.

3 Credit Hours. 2 Lecture Contact Hours. 2 Lab Contact Hours.

Course Attribute(s): Dif Tui- Science & Engineering|Lab Required|Writing Intensive

Grade Mode: Standard Letter

AG 4304. Landscape Management.

To acquaint students with the practices and techniques used in professional landscape construction and management, and with the scientific and technical basis for such practices.

3 Credit Hours. 2 Lecture Contact Hours. 2 Lab Contact Hours.

Course Attribute(s): Dif Tui- Science & Engineering|Lab Required

Grade Mode: Standard Letter

AG 4305. Landscape Design.

Landscaping combines elements of art and science to create functional, aesthetically pleasing outdoor space. This class helps students develop knowledge of design elements and principles. Students learn site and client analysis techniques for critiquing landscapes. Students learn to communicate ideas through the planning and drawing of landscape plans.

3 Credit Hours. 2 Lecture Contact Hours. 2 Lab Contact Hours.

Course Attribute(s): Dif Tui- Science & Engineering|Lab Required

Grade Mode: Standard Letter

AG 4307. Professional Development in Agriculture.

This course requires students to select a topic of current interest appropriate to the major. Critical analysis of the situation including both positive and negative aspects will be encouraged. Findings will be presented in both oral and written form. (Capstone Course).

3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.

Course Attribute(s): Dif Tui- Science & Engineering|Writing Intensive

Grade Mode: Standard Letter

AG 4310. Agricultural Internship.

This course integrates professional and academic experience through internship with an external employer. The internship is designed to provide actual work experience, observation and analysis in the student's chosen career field. Prerequisite: Minimum 3.0 Overall GPA.

3 Credit Hours. 0 Lecture Contact Hours. 6 Lab Contact Hours.

Course Attribute(s): Dif Tui- Science & Engineering

Grade Mode: Standard Letter

AG 4311. Instructional Methods for Career and Technology Educators.

An analysis of the instructional techniques, strategies and methods appropriate to the effective teaching of career and technology subjects. Teaching special populations and teaching in multicultural environments will be addressed. To be taken the Fall semester before student teaching.

3 Credit Hours. 2 Lecture Contact Hours. 2 Lab Contact Hours.

Course Attribute(s): Dif Tui- Science & Engineering|Lab Required|Writing Intensive

Grade Mode: Standard Letter

AG 4321. Reproductive Management in Farm Animals.

This course will provide students with fundamental knowledge to develop reproductive management strategies for livestock and poultry. It will consider the physiology of reproduction and the interactions between reproduction, nutrition, and the environment to improve the efficiency of the herd/flock through appropriate and modern management practices. Prerequisite: AG 3331 with a grade of a "C" or better.

3 Credit Hours. 2 Lecture Contact Hours. 2 Lab Contact Hours.

Grade Mode: Standard Letter

AG 4324. AgroEcology and Integrated Agriculture.

This course focuses on integrative and ecological principles of agricultural production. Topics emphasized are sustainable agriculture, complex systems, production diversity, integrated animal-crop systems, resilience and small producers. Prerequisite: AG 3427 with a grade of "D" or better.

3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.

Grade Mode: Standard Letter

AG 4325. Feeds and Feeding.

This course examines the study of feedstuffs used in livestock enterprises as well as the application of basic nutrients to the needs of different species of livestock. The formulation of rations, methods of feeding, feed control laws, and feeding are also investigated.

Prerequisites: AG 3325 with a grade of "C" or better.

3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.

Course Attribute(s): Dif Tui- Science & Engineering|Lab Required

Grade Mode: Standard Letter

AG 4326. Advanced Animal Science of Ruminants.

This course applies the scientific and technological advances to ruminant production and management. It includes the study of scientific and technological advances with an emphasis on overall management, health care, nutrition, genetics, physiology, and marketing of ruminant animals.

Prerequisite: AG 2318 and AG 3325 both with a grade of "C" or better.

3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.

Course Attribute(s): Dif Tui- Science & Engineering|Lab Required

Grade Mode: Standard Letter

AG 4328. Advanced Animal Science of Non-ruminants.

This course applies the scientific and technological advances to non-ruminant production and management. It includes the study of scientific and technological advances with an emphasis on overall management, health care, nutrition, genetics, physiology, and marketing of non-ruminant animals. Prerequisite: AG 2318 and AG 3325 both with a grade of "C" or better.

3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.

Course Attribute(s): Dif Tui- Science & Engineering

Grade Mode: Standard Letter

AG 4330. Food Technology: Processing Meats.

This course includes the evaluation and grading of carcasses, as well as wholesale and retail cuts of beef, pork, lamb, and poultry. Emphasis will be placed on quality control processes and testing finished meat products that have been frozen, cured, fried, pickled, and canned.

Prerequisites: AG 3382 with a grade of "C" or better.

3 Credit Hours. 2 Lecture Contact Hours. 2 Lab Contact Hours.

Course Attribute(s): Dif Tui- Science & Engineering|Lab Required

Grade Mode: Standard Letter

AG 4331. Disaster Preparedness and Management in Agriculture.

This course provides an investigation of past disaster events that have impacted the global and domestic food and agriculture supply. This course also provides the information needed to develop and execute an action response plan for disasters affecting agricultural operations. Both preparation and mitigation of the disaster will be covered. Prerequisite: AG 3341 with a grade of "C" or better.

3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.

Course Attribute(s): Dif Tui- Science & Engineering

Grade Mode: Standard Letter

AG 4343. Organization and Management for Laboratory Programs.

This course examines instructional programs involving laboratory equipment and facilities. Curriculum, teaching methods, equipment and facility management practices including various aspects of safety, tool management, inventory and security are emphasized along with facilities layout planning. Must be taken in last semester of program. Corequisite: AG 4212 with a grade of "D" or better.

3 Credit Hours. 2 Lecture Contact Hours. 2 Lab Contact Hours.

Course Attribute(s): Dif Tui- Science & Engineering|Lab Required

Grade Mode: Standard Letter

AG 4355. Precision Applications in Land Management.

This course focuses on engineering practices used in surveying including differential profile leveling and construction surveys. Topics include the use of dumpy levels, transits, total stations, and Global Positioning Systems. This course introduces students to the fundamental components of small unmanned aerial systems (sUAS), sensors and platforms, UAS operational concepts, the principles of UAS data collection, the legal framework within which UAS should be operated and applied, and data processing software in agricultural settings.

Prerequisite: [MATH 1315 or MATH 1317 or MATH 1319] with a grade of "D" or better and AG 2373 with a grade of "C" or better.

3 Credit Hours. 2 Lecture Contact Hours. 2 Lab Contact Hours.

Course Attribute(s): Dif Tui- Science & Engineering

Grade Mode: Standard Letter

AG 4361. Agriculture Electric and Mechanical Systems.

This course covers electrical fundamentals applied to agricultural production and processing. Topics include circuits, power, energy, wiring design, and motor fundamentals, in addition to selection, installation and operational characteristics. Sensors and control devices including switches, relays, timers, and circuit breakers will also be studied.

Prerequisite: AG 2373 with a grade of "C" or better.

3 Credit Hours. 2 Lecture Contact Hours. 2 Lab Contact Hours.

Course Attribute(s): Dif Tui- Science & Engineering|Lab Required

Grade Mode: Standard Letter

AG 4371T. International Horticulture.

The purpose of this program is to introduce students to the English culture and way of life, as well as England's historic role in Horticulture, past and present. Students will intensely study from the following four horticultural fields: Ornamental Horticulture, Landscape Design, Vegetables/Fruit Crops, and Vineyards and Hops. The program includes basic instruction in English history, as well as lectures and field trips.

3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.

Course Attribute(s): Exclude from 3-peat Processing|Dif Tui- Science & Engineering|Topics

Grade Mode: Standard Letter

AG 4371V. Green Revolution & Agricultural Development in Asia.

This course will provide a detailed retrospective of the Green Revolution in Asia, its achievement and limits in terms of agricultural productivity improvement, and its broader impact at social, environmental, and economic levels.

3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.

Course Attribute(s): Exclude from 3-peat Processing|Dif Tui- Science & Engineering|Topics

Grade Mode: Standard Letter

AG 4371Y. Field Experiences in Regenerative Agriculture.

This course focuses on experiential field-based activities and technologies in regenerative agriculture that improve the health and functioning of an ecosystem. Students will gain experience with metrics to assess agroecological health as well as methods, tools and technologies to improve soil biophysical qualities, biodiversity, water and nutrient cycling, and energy balance. Creating resilience to climate change, developing circular economies, and increasing farm profitability are explored. In a field setting, regenerative agriculture techniques with respect to crop production are practiced. Prerequisite: [AG 2313 or AG 2379] and AG 3426 both with grades of "C" or better.

3 Credit Hours. 1 Lecture Contact Hour. 2 Lab Contact Hours.

Course Attribute(s): Exclude from 3-peat Processing|Dif Tui- Science & Engineering|Topics

Grade Mode: Standard Letter

AG 4372. Pasture and Range Plants.

This course focuses on identifying pasture and range plants. The course covers morphology and anatomy of plants related to pasture and rangeland plants. Students will learn to use identification keys, and specifically will learn to identify grasses and forbs, in the field and laboratory. Students will develop a specimen collection and learn herbarium preservation techniques. The associations of rangeland plants to their environment, such as, soil type relationships, grazing utility and palatability will also be covered. Invasive species and non-native species will be included. Prerequisite: [AG 2301 or AG 2379 or AG 1301] and BIO 1330 with grades of "C" or better.

3 Credit Hours. 1 Lecture Contact Hour. 3 Lab Contact Hours.

Grade Mode: Standard Letter

AG 4375. Senior Design in Agricultural Mechanics.

This course deals with application of technical and non-technical skills, and knowledge using a multidisciplinary team-based approach. Students will solve real-world problems related to product and process development in agricultural mechanics. The topics include systematic product development, development of business plans, project management, cost estimation, documentation and presentation, prototyping, fabrication and concurrent development. Prerequisite: AG 2374 and AG 3353 and AG 4361 all with grades of "C" or better.

3 Credit Hours. 2 Lecture Contact Hours. 2 Lab Contact Hours.

Grade Mode: Standard Letter

AG 4379. Agriculture Irrigation Technology.

This course teaches the principles associated with water management practices in maintaining soil productivity and the influence of water management on environmental quality. Emphasis will be placed on the selection and layout of irrigation and drainage systems, waste management systems, and the impact on the environment. Prerequisite: AG 2373 with a grade of "C" or better.

3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.

Course Attribute(s): Dif Tui- Science & Engineering

Grade Mode: Standard Letter

AG 4380. Agricultural Finance.

This course introduces finance and financial problems faced by agribusiness managers. The subject matter includes financial analysis, planning, and control; capital budgeting; capital structure, liquidity, and risk management; and financial markets. Prerequisite: ACC 2361 and AG 2383 and [MATH 1315 or MATH 1319 or MATH 2321 or MATH 2417 or MATH 2471] all with grades of "D" or better.

3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.

Course Attribute(s): Dif Tui- Science & Engineering

Grade Mode: Standard Letter

AG 4381. Agricultural Policy.

Identification and analysis of governmental programs and policies affecting the production and marketing of agricultural products. An economic evaluation of alternative policies and their application for farmers, consumers and agribusinesses will be considered. (WI) Prerequisite: AG 2383 and [MATH 1315 or MATH 1319 or MATH 2321 or MATH 2417 or MATH 2471] both with grades of "D" or better.

3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.

Course Attribute(s): Dif Tui- Science & Engineering|Writing Intensive

Grade Mode: Standard Letter

AG 4382. Agricultural Price Analysis.

This course focuses on the forces that influence agricultural price movements and behavior, including consumer and producer theory, and market demand and supply with their associated determinants. The course also covers commodity futures and their use by agribusiness firms to reduce price risk. An explanation of simple and multiple regression is introduced to help the student understand empirical estimation of commodity demand and supply relationships, and reduced-form, price-dependent equations that offer insight into price-making forces. Price determination under alternative market structures is also reviewed and expanded. (WI) Prerequisite: AG 3350 and AG 3352 and [MATH 1315 or MATH 1319 or MATH 2321 or MATH 2417 or MATH 2471] all with grades of "D" or better.

3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.

Course Attribute(s): Dif Tui- Science & Engineering|Writing Intensive

Grade Mode: Standard Letter

AG 4383. Agricultural Resource Economics.

This course introduces economic concepts and institutional factors relating to the use of agricultural resources such as land, air, water, energy, space, etc. Emphasis is on the conservation of resources and the environmental interactions resulting from the use of natural resources for agricultural production. (WI) Prerequisite: AG 2383 and [MATH 1315 or MATH 1319 or MATH 1329 or MATH 2321 or MATH 2417 or MATH 2471] both with grades of "D" or better.

3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.

Course Attribute(s): Dif Tui- Science & Engineering|Writing Intensive

Grade Mode: Standard Letter

AG 4385. Data Science and its Application in Agriculture.

This course is an introduction to data science that analyzes big data with emphasis on its application in agriculture. Students will learn: 1) how to analyze big data and make data-driven predictions through probabilistic modeling and statistical inference; 2) how to identify and utilize appropriate statistical and econometric methodologies to extract meaningful information for decision making in agriculture; and 3) how to use software such as Excel and R to implement statistical and econometric analysis and present results. Prerequisite: AG 2390 and AG 3352 both with grades of "D" or better.

3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.

Grade Mode: Standard Letter

AG 4390. Global Agriculture.

This study abroad course focuses on global agricultural industries and markets, including analysis of production, marketing and trade. The course examines the shape of international agriculture; how culture, history and geography in foreign countries affect the production and management of agricultural products; agricultural policy formation; countries' natural resources and competitive strategies. Course may be repeated when topic varies.

3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.

Course Attribute(s): Exclude from 3-peat Processing|Dif Tui- Science & Engineering

Grade Mode: Standard Letter

AG 4391. Agro-Climatology.

This course focuses on the study of climate, and climate change impacts on agricultural systems. This will include fundamental elements of the water cycle, changes in surface hydrology, policy related to agricultural water resources and production. Atmospheric CO₂, and water vapor influences on climate will be explored, as well as geographic agricultural refugia and crop migration. Prerequisite: GEO 1305 and GEO 1105 and AG 3427 all with grades of "D" or better.

3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.

Grade Mode: Standard Letter

AG 4401. Genetics and Breeding for Crop Selection.

This course covers traditional breeding and selection in crops with an emphasis on genetics. The course includes topics on phenology, phenotype, genotype, heritability and epigenetics. The course includes a lab. Prerequisites: AG 1301 and [[AG 2301 and 2101] or AG 2379] all with grades of "C" or better and BIO 1130 and BIO 1330 and CHEM 1141 and CHEM 1341 all with grades of "D" or better.

4 Credit Hours. 3 Lecture Contact Hours. 3 Lab Contact Hours.

Course Attribute(s): Dif Tui- Science & Engineering

Grade Mode: Standard Letter

AG 4402. Soil and Crop Mycology.

This course addresses the agro-ecological importance of the mycorrhizal community influence on crop health and nutrition as related to regenerative agriculture and utilizing ecosystem processes to promote crop production. The roles of endo- and ectomycorrhiza are discussed in relation to plant pathology, soil aggregation, and mineral dissolution from parent material, and how these organisms assist the soil and crop production ecosystem. The laboratory exercises will include fungi identification, morphology, and root inoculation. Prerequisite: AG 3427 with a grade of "D" or better.

4 Credit Hours. 3 Lecture Contact Hours. 2 Lab Contact Hours.

Grade Mode: Standard Letter

AG 4403. Crop Physiology.

This course focuses on the study of changes in crop physiology and morphology induced by normal growth conditions, and those caused by adverse growing conditions. Topics will include production impacts of climate change (flood, drought, changing growing degree days, heat and cold), poor nutrition, poor soils, and disease. Prerequisite: AG 3427 with a grade of "D" or better.

4 Credit Hours. 3 Lecture Contact Hours. 2 Lab Contact Hours.

Grade Mode: Standard Letter

AG 4404. Rhizosphere Ecology.

This course investigates the emerging science on rhizosphere ecology. Specifically, the course discusses rhizophagy, microbial root colonization, root exudates, carbon cycling, allelochemistry and plant-plant signaling) and nutrient transfer to crops in the rhizosphere. Other topics include root growth and elongation responses to the presence and absence of the microbial community. Prerequisite: AG 3427 with a grade of "D" or better.

4 Credit Hours. 3 Lecture Contact Hours. 2 Lab Contact Hours.

Grade Mode: Standard Letter

AG 4408. Range Synecology.

This course investigates the relationships of range plants to each other. Topics include woody plant encroachment, resilience theory, allelochemistry, kairomone and phytotoxin releases for competitive exclusion. Importantly, the topic of range recovery, ecosystem services, recovery from disturbance, successional stages, climax conditions and how livestock production is impacted will be covered. Prerequisite: AG 3427 with a grade of "D" or better.

4 Credit Hours. 3 Lecture Contact Hours. 2 Lab Contact Hours.

Grade Mode: Standard Letter

AG 4681. Student Teaching in Agriculture, Food, and Natural Resources 6-12.

Students will apply knowledge and skills learned during the teacher preparation program while engaging in clinical practice with experienced Agriculture mentor teachers in school settings with university instruction and supervision. This culmination experience is required for Texas teacher certification. Prerequisite: Minimum 2.75 Overall GPA and instructor approval.

6 Credit Hours. 0 Lecture Contact Hours. 6 Lab Contact Hours.

Course Attribute(s): Dif Tui- Science & Engineering|Writing Intensive

Grade Mode: Credit/No Credit