Crop, Soil, and Environmental Sciences - CSES

Courses

CSES 1010 SOILS AND LIFE (4) LEC. 3. LAB. 2. Science Core. Practical applications of important soil properties and their function in everyday life. Connections between soils and human life will be made. topics include food security, sustainable agricultural production, soil and water quality, and waste disposal.

CSES 1020 CROPS AND LIFE (4) LEC. 3. LAB. 2. Science Core. Essential role of crop plants to human life. Topics will include historical development of crop science, impact of crop science on human development, and major issues and problems facing modern crop science and technology.

CSES 2000 BASIC CROP SCIENCE (4) LEC. 3. LAB. 2. Agronomic principles of classification, growth, structure, and soil-plant relationship of field crops, with emphasis on influence of man and environment, and importance of crop production.

CSES 2040 BASIC SOIL SCIENCE (4) LEC. 3. LAB. 2. Pr. (CHEM 1010 and CHEM 1011) or (CHEM 1030 and CHEM 1031) or (CHEM 1110 and CHEM 1111) or (CHEM 1117 and CHEM 1118) or (CHEM 1033 and CHEM 1031). Formation, classification, properties, management, fertility and conservation of soils in relation to the growth of plants. Fall, Spring.

CSES 2910 TURFGRASSES: USES AND CARE FOR SPORTS AND LEISURE (2) LEC. 2. Introduction to the commonly used turfgrasses of the southeastern United States including of these turfgrasses for gold courses, athletic fields and home lawns will be included. This course may not be substituted for CSES 3150.

CSES 3120 PRINCIPLES OF WEED SCIENCE (4) LEC. 3. Pr. (CSES 2040 or CSES 2043) or (AGRN 2040 or AGRN 2043) and (BIOL 1020 or BIOL 1027). Weed identification and biology, methods of weed management and classification of herbicides and how they are used in weed control. Laboratory subjects are weed identification and sprayer calibration. Fall.

CSES 3150 TURFGRASS MANAGEMENT (4) LEC. 3. LAB. 2. Pr. (CSES 2040 or CSES 2043 or AGRN 2040 or AGRN 2043) and (BIOL 1020 or BIOL 1027). The management of recreational and home area turfgrass will be studied including establishment and maintenance of turf and the effect of light, traffic, soil fertility and water on its growth. Fall, Spring.

CSES 3200 APPLIED TURF MANAGEMENT (3) LEC. 1. LAB. 4. Pr. (P/C CSES 3150 or CSES 3153) or (AGRN 3150 or AGRN 3153). Familiarize students with the operation and maintenance of the equipment used for turfgrass maintenance. Effects on turfgrass performance will also be covered.

CSES 3300 PLANT GENETICS AND CROP IMPROVEMENT (3) LEC. 3. Pr. (P/C CSES 2000) or (BIOL 1020). Principles related to mendelian, population, and molecular genetics of plants including inheritance of qualitative and quantitative traits, and plant transformation. Improvement of crop plants including heritability, role of environment, pedigree selection, recurrent selection, the backcross method, and marker-assisted selection. Fall

CSES 3920 INTERNSHIP (3) INT. 3. Practical experience under the the supervision of an approved employer and the department. Internship may be in the areas of production, business, turf or science. Course may be repeated for a maximum of 6 credit hours.

CSES 3960 SPECIAL PROBLEMS (2) LAB. 2. Departmental approval. Individual and group problems investigations in crop, soil or weed science. Course may be repeated for a maximum of 4 credit hours.

CSES 3970 SPECIAL TOPICS (3) ST1. 3. New topics in agronomy and soils. Course may be repeated for a maximum of 6 credit hours.

CSES 4100 CROPS JUDGING (2) LEC. 1. LAB. 2. Departmental approval. Crops Judging is a course designed to prepare students for the national Crops Judging contest held at the Students of Agronomy, Soils and Environmental Sciences annual meeting. Students will learn practical knowledge to diagnose in-field agronomic problems such as crop nutrient deficiencies, disease damage, insect damage, weed pressure, herbicide injury, and soil management issues. Students must participate in the Crops Judging Contest at the SASES meeting in the semester the class is taken. Course may be repeated for a maximum of 6 credit hours.

CSES 4200 SOIL JUDGING (2) LEC. 1. LAB. 4. Description, evaluation and interpretation of soil-profile characteristics. Fall. Course may be repeated for a maximum of 8 credit hours.

CSES 4210 ADVANCED SOIL JUDGING (2) LEC. 1. LAB. 2. Pr. CSES 4200 or (AGRN 4200 or AGRN 4203). Advanced description, evaluation, and interpretations of soil-profile characteristics. Spring. Course may be repeated for a maximum of 8 credit hours.

CSES 4300 TURFGRASS COMPETITIONS (2) LEC. 1. LAB. 2. Departmental approval. The class is a comprehensive overview of practical turfgrass management in preparation for student competitions organized by the Sports Field Managers Association 9SFMA Student Challenge)and the Golf Course Superintendents Association of America (Turf Bowl). Students will compete in one or both of these contests during the semester following successful completion of the course. Course may be repeated for a maximum of 6 credit hours.

CSES 4950 SENIOR SEMINAR (2) LEC. 2. This course will cover professional presentations, both oral and written, in the area of Agronomy and Soils.

CSES 4967 HONORS SPECIAL PROBLEMS (1-3) IND. Pr. Honors College. Course may be repeated for a maximum of 3 credit hours.

CSES 4997 HONORS THESIS (1-3) IND. Pr. Honors College. Departmental approval.. Course may be repeated for a maximum of 3 credit hours.

CSES 5000 ENVIRONMENTAL QUALITY (3) LEC. 3. Role of global land use in biogeochemical cycling of major elements and compounds of environmental concern; interactions of pollutants with soils and aquatic and atmospheric environments; methods to minimize or correct pollution; risk assessment.

CSES 5010 ANALYSIS OF PLANT, SOIL, AND ANIMAL DATA (3) LEC. 3. Pr. (MATH 1130 or MATH 1133) or (STAT 2510 or STAT 2513). Principles of data analysis based on real examples will be discussed. Topics include measures of central tendency, dispersion, confidence intervals, sampling issues, probability distributions, etc.

CSES 5020 NUTRIENT MANAGEMENT (3) LEC. 3. Pr. (CSES 2040 or CSES 2043) or (AGRN 2040 or AGRN 2043). Lectures and problems illustrate principles of nutrient management as related to soil or growth media, plant, fertilizer practices, management systems and environment. Required for all students majoring in Agronomy and Soils. Spring.

CSES 5030 ADVANCED CROP SCIENCE (3) LEC. 3. Pr. (CSES 1000 or CSES 1003 or CSES 2000) or (AGRN 1000 or AGRN 1003 or AGRN 1007) or (AGRN 2040 or AGRN 2043) and (CSES 2040 or CSES 2043) and (BIOL 1030 or BIOL 1037). Application and integration of principles from undergraduate agricultural, biological and physical sciences courses in management of crop production systems. May count either CSES 5030.

CSES 5060 SOIL MICROBIOLOGY LECTURE (3) LEC. 3. Pr. BIOL 3200. Ecology, physiology, and biochemistry of soil microorganisms with emphasis on soil microbial processes that are important to environmental quality and soil productivity. Spring.

CSES 5061 SOIL MICROBIOLOGY LAB (1) LAB. 2. Pr. (P/C CSES 5060 or P/C CSES 5063) or (P/C AGRN 5060 or P/C AGRN 5063). Laboratory exercises illustrating ecology, physiology, and biochemistry of soil microorganisms. Credit will not be given for both CSES 5061 and CSES 6061. Spring.

CSES 5080 SOIL RESOURCES AND CONSERVATION (4) LEC. 3. LAB. 2. Pr. (CSES 2040 or CSES 2043) or (AGRN 2040 or AGRN 2043). Soils as a natural resource for land-use planning; their use and management for sustainable crop production, urban and industrial development and ecosystem protection. CSES 5080 Summer. CSES 5083 Fall.

CSES 5100 PLANT GENETICS AND CROP IMPROVEMENT (3) LEC. 3. Pr. BIOL 1030 or BIOL 1037. Principles related to mendelian, population, and molecular genetics of plants including inheritance of qualitative and quantitative traits, and plant transformation. Improvement of crop plants including heritability, role of environment, pedigree selection, recurrent selection, the backcross method, and marker-assisted selection. Fall

CSES 5110 PLANT BREEDING I (3) LEC. 3. Pr. CSES 3300 or BIOL 3000 or BIOL 3003 or AGRI 3000. Fundamental principles and theories utilized in the science of plant breeding and cultivar development and the role breeding plays in crop improvement.

CSES 5120 PLANT BREEDING II (3) LEC. 3. Pr. CSES 5110. Review and contrast how major crop species breeding strategies are determined. Emphasis on integration of traditional methodologies with modern genetic and genomic technologies.

CSES 5150 SOIL MORPHOLOGY (4) LEC. 3. LAB. 2. Pr. (CSES 2040 or CSES 2043) or (AGRN 2040 or AGRN 2043). Physical, chemical and mineralogical properties of soils are studied in relation to their distribution and classification for environmental, engineering and agricultural use and interpretations. Spring.

CSES 5160 ADVANCED TURFGRASS MANAGEMENT (3) LEC. 3. Pr. (CSES 3150 or CSES 3153) or (AGRN 3150 or AGRN 3153). Factors affecting the turfgrass plant as a component of a dynamic community. Influence of soil chemical and physical conditions, management practices and climate are discussed. Theoretical and practical aspects of turfgrass management practices are discussed along with design and construction of golf courses and other athletic purpose turf areas.

CSES 5200 APPLIED WEED SCIENCE TECHNOLOGY (3) LEC. 3. SU. Pr. (CSES 3120 or CSES 3123) or (AGRN 3120 or AGRN 3123). Advanced weed identification, pesticide application technology, identification of herbicide injury symptomology, and develop of interaction techniques and problem solving skills for dealing with potential herbicide efficacy problems. Course may be repeated for a maximum of 6 credit hours.

CSES 5240 CROP PHYSIOLOGY (3) LEC. 3. Pr. BIOL 3100 or HORT 3000. Integrates principles of plant physiology, biochemistry, ecology, and genetics as they relate to plant growth and development and crop yield. The effect of management practices and abiotic stress on plant growth and development will be discussed. Credit will only be given for one of the following: CSES 5240 or CSES 6240.

CSES 5250 AQUATIC SEDIMENTS (4) LEC. 3. LAB. 1. An overview of sediments in aquatic environments with a focus on the biogeochemistry, storage capacity, and use in paleoenvironmental reconstruction.

CSES 5300 SOIL CHEMISTRY (4) LEC. 3. LAB. 2. Pr. (CSES 2040 or CSES 2043) or (AGRN 2040 or AGRN 2043). An introduction to the basic soil chemical properties of mineral composition, weathering, absorption, cation exchange, acidity, alkalinity, salinity and soil reactions with fertilizers, pesticides and heavy metals. Spring.

CSES 5400 BIOENERGY AND THE ENVIRONMENT (3) LEC. 3. The role of bioenergy in reducing environmental problems related to use of fossil fuels and certain agricultural practices, and in addressing declining rural economies.

CSES 5500 FORAGE PRODUCTION AND UTILIZATION (3) LEC. 3. Grass and legume forage crops. The crops are considered from the standpoint of (a) pasture crops, (b) hay and silage crops, (c) soil-improving crops. Spring. May count either CSES 5500 or CSES 5503.

CSES 5590 ENVIRONMENTAL SOIL PHYSICS AND VADOSE ZONE HYDROLOGY (4) LEC. 3. LAB. 2. Pr. CSES 2040. Explore the dynamic interplay of soil physical properties and vadose zone hydrology in this comprehensive environmental soil physics course. Delve into the intricate mechanisms governing the movement of water, chemicals, heat, and gases through soils within diverse ecosystems, including agricultural, urban, and natural landscapes. Uncover the complexities of the soil-plant-atmosphere continuum and gain hands-on experience with field instrumentation for precise measurement and assessment of soil physical properties.

CSES 5800 CLIMATE, WATER, AND LIFE (3) LEC. 3. LAB. 0. The course will introduce essential hydroclimate processes and phenomena, and their impacts on water resources, food and agriculture, and ecosystems. Major topics include climate variability and change, radiation, temperature, humidity, precipitation, land surface energy and water fluxes, their linkages with plants and humans, and climate hazards and resiliency.

CSES 5960 SPECIAL PROBLEMS (1-3) IND. Work under the direction of a staff member on special problems in crop, soil or weed science. Course may be repeated for a maximum of 6 credit hours.

CSES 6000 ENVIRONMENTAL QUALITY (3) LEC. 3. Role of global land use in bio-geochemical cycling of major elements and compounds of environmental concern; interactions of pollutants with soils and aquatic and atmospheric environments; methods to minimize or correct pollution; risk assessment.

CSES 6010 ANALY PLANT, SOIL & ANI DATA (3) LEC. 3. Pr. (MATH 1130 or MATH 1133) or (STAT 2510 or STAT 2513). Principles of data analysis based on real examples will be discussed. Topics include measures of central tendency, dispersion, confidence intervals, sampling issues, probability distributions, etc.

CSES 6020 NUTRIENT MANAGEMENT (3) LEC. 3. Pr. (CSES 2040 or CSES 2043) or (AGRN 2040 or AGRN 2043). Lectures and problems illustrate principles of nutrient management as related to soil or growth media, plant, fertilizer practices, management systems and environment. Required for all students majoring in Agronomy and Soils. Spring.

CSES 6030 ADVANCED CROP SCIENCE (3) LEC. 3. Application and integration of principles from undergraduate agricultural, biological and physical sciences courses in management of crop production systems. May count either CSES 5030/CSES 6030 or CSES 5033/CSES 6036.

CSES 6060 SOIL MICROBIOLOGY LECTURE (3) LEC. 3. Pr. BIOL 3200. Ecology, physiology, and biochemistry of soil microorganisms with emphasis on soil microbial processes that are important to environmental quality and soil productivity. Spring.

CSES 6061 SOIL MICROBIOLOGY LAB (1) LAB. 2. Pr. (P/C CSES 6060 or P/C CSES 6066) or (P/C AGRN 6060 or P/C AGRN 6066). Laboratory exercises illustrating ecology, physiology, and biochemistry of soil microorganisms. Credit will not be given for both CSES 5061 and CSES 6061. Spring.

CSES 6080 SOIL RESOURCES AND CONSERVATION (4) LEC. 3. LAB. 2. Pr. (CSES 2040 or CSES 2043) or (AGRN 2040 or AGRN 2043). Soils as a natural resource for land-use planning; their use and management for sustainable crop production, urban and industrial development and ecosystem protection. CSES 6080 Summer. CSES 6086 Fall.

CSES 6110 PLANT BREEDING I (3) LEC. 3. Fundamental principles and theories utilized in the science of plant breeding and cultivar development and the role breeding plays in crop improvement.

CSES 6120 PLANT BREEDING II (3) LEC. 3. Pr. CSES 6110. Review and contrast how major crop species breeding strategies are determined. Emphasis on integration of traditional methodologies with modern genetic and genomic technologies.

CSES 6150 SOIL MORPHOLOGY (4) LEC. 3. LAB. 2. Pr. (CSES 2040 or CSES 2043) or (AGRN 2040 or AGRN 2043). Physical, chemical and mineralogical properties of soils are studied in relation to their distribution and classification for environmental, engineering and agricultural use and interpretations. Spring.

CSES 6160 ADVANCED TURFGRASS MANAGEMENT (3) LEC. 3. Pr. (CSES 3150 or CSES 3153) and (BIOL 3100 or BIOL 6130) or (AGRN 3150 or AGRN 3153). Factors affecting the turfgrass plant as a component of a dynamic community. Influence of soil chemical and physical conditions, management practices and climate are discussed. Theoretical and practical aspects of turfgrass management practices are discussed along with design and construction of golf courses and other athletic purpose turf areas.

CSES 6200 APPLIED WEED SCIENCE TECH (3) LEC. 3. SU. Pr. (CSES 3120 or CSES 3123) or (AGRN 3120 or AGRN 3123). Advanced weed identification, pesticide application technology, identification of herbicide injury symptomology, and develop of interaction techniques and problem solving skills for dealing with potential herbicide efficacy problems. Course may be repeated for a maximum of 6 credit hours.

CSES 6240 CROP PHYSIOLOGY (3) LEC. 3. Integrates principles of plant physiology, biochemistry, ecology, and genetics as they relate to plant growth and development and crop yield. The effect of management practices and abiotic stress on plant growth and development will be discussed. Credit will only be given for one of the following: CSES 5240 or CSES 6240.

CSES 6250 AQUATIC SEDIMENTS (4) LEC. 3. LAB. 1. An overview of sediments in aquatic environments with a focus on the biogeochemistry, storage capacity, and use in paleoenviromental reconstruction.

CSES 6300 SOIL CHEMISTRY (4) LEC. 2. LAB. 4. Pr. (CSES 2040 or CSES 2043) or (AGRN 2040 or AGRN 2043). An introduction to the basic soil chemical properties of mineral composition, weathering, absorption, cation exchange, acidity, alkalinity, salinity and soil reactions with fertilizers, pesticides and heavy metals. Spring.

CSES 6400 BIOENERGY AND THE ENVIRONMENT (3) LEC. 3. The role of bioenergy in reducing environmental problems related to use of fossil fuels and certain agricultural practices, and in addressing declining rural economies.

CSES 6500 FORAGE PRODUCTION AND UTILIZATION (3) LEC. 3. Pr., In major or departmental approval. Grass and legume forage crops. The crops are considered from the standpoint of (a) pasture crops, (b) hay and silage crops, (c) soil-improving crops and (d) energy crops. May count either CSES 6500 or CSES 6506.

CSES 6590 ENVIRONMENTAL SOIL PHYSICS AND VADOSE ZONE HYDROLOGY (4) LEC. 3. LAB. 2. Pr. CSES 2040. Explore the dynamic interplay of soil physical properties and vadose zone hydrology in this comprehensive environmental soil physics course. Delve into the intricate mechanisms governing the movement of water, chemicals, heat, and gases through soils within diverse ecosystems, including agricultural, urban, and natural landscapes. Uncover the complexities of the soil-plant-atmosphere continuum and gain hands-on experience with field instrumentation for precise measurement and assessment of soil physical properties.

CSES 6800 CLIMATE, WATER, AND LIFE (3) LEC. 3. The course will introduce essential hydroclimate processes and phenomena, and their impacts on water resources, food and agriculture, and ecosystems. Major topics include climate variability and change, radiation, temperature, humidity, precipitation, land surface energy and water fluxes, their linkages with plants and humans, and climate hazards and resiliency.

CSES 6900 DIRECTED STUDIES (1-3) DSL/LEC. Conferences, problems and assigned reading in soils and crops, including results of agronomic research from the substations and experiment fields. Course may be repeated for a maximum of 6 credit hours.

CSES 6930 ADVANCED DIRECTED STUDIES (1-3) DSL/LEC. SU. Conferences, problems and assigned reading in soils and crops, including results of agronomic research from the substations and experiment fields. Course may be repeated for a maximum of 6 credit hours.

CSES 6960 SPECIAL PROBLEMS (1-3) DSL/IND. Conferences, problems and assigned reading in soils and crops, including results of agronomic research from the substations and experiment fields. Course may be repeated for a maximum of 6 credit hours.

CSES 7080 EXPERIMENTAL METHODS (3) LEC. 3. Pr. STAT 7000. Experimentation in the agricultural sciences including experimental techniques, interpretation of research data, use of library references, and preparation of publications. Problems, assigned readings and lectures. Summer.

CSES 7120 PLANT GENOMICS (3) LLB. Hands-on bioinformatics of complex plant genomes, including assembly and annotation. Writing- and bioinformatics-intensive course that culminates in a plant genome manuscript. Fall.

CSES 7140 CHEMISTRY AND USE OF HERBICIDES IN CROP PRODUCTION (4) LEC. 3. LAB. 2. Pr. CHEM 1040. Principles and use of herbicides in agronomic crops. Methods of herbicide application, including time, incorporation and formulation, the fate of herbicides in soil and the ecological impact on succeeding plant species. Fall.

CSES 7160 GENETIC DATA ANALYSIS (3) LEC. 3. Pr. (CSES 5100 or CSES 5103) or (CSES 6100 or CSES 6106) and STAT 4020 or (AGRN 5100 or AGRN 5103) or (AGRN 6100 or AGRN 6106). Introduces procedures to study the genetic characteristics of individuals and populations. Computer models will be used to simulate genomes and traits. Application of quantitative methods to experimental populations used to plan breeding programs. Fall.

CSES 7170 ADVANCED PLANT BREEDING (3) LEC. 3. Pr. CSES 7160 or (AGRN 7160 or AGRN 7166). Estimation and interpretation of genetic variance components, heritability, selection response, yield stability indices and their effect on choice of breeding method. Recurrent selection theory and breeding for resistance to plant stresses.

CSES 7180 SUSTAINABLE AGROECOLOGY (3) LEC. 3. Pr. (BIOL 6130 or CSES 7250) or (AGRN 7250 or AGRN 7256) and (CSES 2040 or CSES 2043) or (AGRN 2040 or AGRN 2043). The study of interactions between crops and abiotic and biotic environments. Emphasis is placed on quantitatively examining theory and principles for production, stability and sustainability of agricultural ecosystems. Graduate standing in CSES or departmental approval

CSES 7270 QUANTITATIVE GENETICS IN PLANT BREEDING (3) LEC. 3. Quantitative and population plant genetics and their interrelationship with plant breeding. Genetic and environmental variation and how they relate to selection procedures and choice of type of variety. Predictive plant breeding. QTL discovery, molecular breeding, and genomic selection in an applied breeding program.

CSES 7540 PRINCIPLES OF PLANT NUTRITION (3) LEC. 3. Pr. CSES 6020 or CSES 6026 or (AGRN 6020 or AGRN 6026). Processes of nutrient flux to plant roots growing in soil. Chemistry and properties of soil in relation to the nutrition and growth of plants. Summer.

CSES 7600 AGROCLIMATOLOGY (3) LEC. 3. The relationships between climatological processes and agriculture, including precipitation, evapotranspiration, meteorological hazards, irrigation and drainage, crop development, climate data acquisition and analysis, crop-weather models, and impacts of global climate change. May count either CSES 7600 pr CSES 7606.

CSES 7670 SPECIAL TOPICS (1-4) DSL/LEC. Advanced topics related to Crop, Soil and Environmental Sciences. Course may be repeated for a maximum of 8 credit hours.

CSES 7800 DEEP LEARNING FOR ENVIRONMENTAL SCIENCES (3) LEC. 2. LAB. 2. The course will cover concepts and applications of deep learning for environmental sciences. The goal is to understand the concepts and applications of deep learning methods in environmental sciences, formulate relevant environmental, climate, and earth system science problems, and how to use these methods for understanding and developing creative solutions to these problems.

CSES 7950 SEMINAR (1) DSL/SEM. 1. SU. Required of all graduate students in Agronomy and Soils. Fall, Spring. Course may be repeated for a maximum of 2 credit hours.

CSES 7970 SPECIAL TOPICS (1-4) LEC. 1-4, LAB. 1-4. Advanced topics related to Crop, Soil and Environmental Sciences. Course may be repeated for a maximum of 8 credit hours.

CSES 7990 RESEARCH AND THESIS (1-10) DSL/MST. Research and thesis on problems in the soil and crop sciences. Course may be repeated with change in topics.

CSES 8570 PHYSICAL SOIL CHEMISTRY (3) LEC. 3. Pr. (CSES 6300 or CSES 6306) and CHEM 6070 or (AGRN 6300 or AGRN 6306). Interpretation of soil properties and chemical reactions in terms of ion exchange, solubility diagrams, solutions equilibria, electrochemistry and electrokinetics of charged particles. Fall.

CSES 8580 FATE AND TRANSPORT OF CHEMICALS IN SOILS (3) LEC. 3. Pr. MATH 1720 and (PHYS 1600 or PHYS 1607) and CSES 7590. Transport phenomena in soils. Physical principles and analysis of the storage and movement of water, solutes, heat, and gases in soils. Spring.

CSES 8990 RESEARCH AND DISSERTATION (1-10) DSR. Research and dissertation on problems in the soil and crop sciences. Course may be repeated with change in topics.