

# Crop, Soil, and Environmental Sciences - CSES

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## 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 golf 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 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 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 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 SOILS & ENVIRONMENTAL QUALITY (3)** LEC. 3. Pr. (CSES 2040 or CSES 2043) or (AGRN 2040 or AGRN 2043). Role of soils 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 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 (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 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 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 (4)** LEC. 3. LAB. 2. Pr. CSES 2040. This course is designed to make the students understand basic soil physical properties and processes occurring in soils. All concepts are based on sound physical and mathematical principles. May count either CSES 5593 or CSES 6590 or CSES 6593.

**CSES 5800 CLIMATE AND LIFE (3)** LEC. 3. LAB. 0. Pr. (MATH 1610) or (STAT 2510) or (PHYS 1500). The course will introduce essential climate processes and phenomena, and their interactions with life. 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 resilience and service.

**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 SOILS & ENVIRONMENTAL QUALITY (3)** LEC. 3. Pr. (CSES 2040 or CSES 2043) or (AGRN 2040 or AGRN 2043). Role of soils 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 6100 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 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 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 paleoenvironmental 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 (4)** LEC. 3. LAB. 2. Pr. CSES 2040. Graduate level standing in AGRN, CSES 2040, or departmental approval. This course is designed to make the students understand basic soil physical properties and processes occurring in soils. All concepts are based on sound physical and mathematical principles. May count either CSES 5590 or CSES 5593 or CSES 6590 or CSES 6596.

**CSES 6800 CLIMATE AND LIFE (3)** LEC. 3. The course will introduce essential climate processes, phenomena, and their interactions with life. 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 resilience and service.

**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 7250 CROP PHYSIOLOGY (3)** LEC. 3. Pr. BIOL 3100. 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.

**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 or 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 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.