CROP AND SOIL SCIENCES CSS

Department of Crop and Soil Sciences
College of Agriculture and Natural Resources

101 Introduction to Crop Science
Fall. 3(2-2)
Principles of crop production including crop and soil management and improvement. International and sustainable agriculture. Water quality issues.

105 Agricultural Industries Seminar
Fall. 1(2-0) SA: AEE 105
Preparing students to succeed academically and professionally and introducing them to opportunities in the agriculture industry.

110 Computer Applications in Agronomy
Fall. 2(1-2) R: Open only to students in the College of Agriculture and Natural Resources. Not open to students with credit in CSE 101.
Use of computers in agriculture. Basic computer operating systems. Management and use of storage media. Laboratory experience in word processing, spread sheets, data bases, programming languages, networking, and software related to agriculture.

120 Agricultural Industry Issues
Fall. 3(3-0)
Issues facing the agricultural industry. Role of government in addressing these issues.

124 Introduction to Sustainable Agriculture and Food Systems
Fall, Spring. 1(0-2) Interdepartmental with Environmental Studies and Agriscience and Horticulture. Administered by Crop and Soil Sciences.
Impact of agricultural and social sciences on our food system. Contemporary research and movements involving agricultural and food system sustainability.

135 Crop Scouting and Investigation
Spring. 2(3-0) Interdepartmental with Horticulture. Administered by Crop and Soil Sciences. P: CSS 101 or HRT 203
Crop production, pest scouting and other production problems, and field diagnoses. Interaction with agriculture clientele. Offered first ten weeks of semester.

151 Seed and Grain Quality
Spring. 2(2-2) SA: CSS 051
Principles and practices of producing, conditioning, testing and marketing field crop seed. Grain grading and quality evaluation. Offered first ten weeks of semester.

171 Operations Budgeting for Golf Course Managers
Spring. 2(3-0) RB: CSS 232 and CSS 210 Not open to students with credit in CSS 071.
Budgeting. Financial analysis. Purchasing and materials management for golf course operations. Offered first ten weeks of semester.

178 Turfgrass Irrigation
Spring. 3(3-2) P: CSS 232
Turfgrass irrigation systems. Installation and maintenance including water management. Offered first ten weeks of semester.

181 Pesticide and Fertilizer Application Technology
Spring. 3(3-3) SA: CSS 081
Effective and efficient application of pesticides and fertilizers to turf and ornamentals. Pesticide handling, legal, and environmental concerns. Calibration of equipment. Offered first ten weeks of semester.

192 Professional Development Seminar I
Spring. 1(0-2) R: Open only to students in the Department of Crop and Soil Sciences.
Career development, critical issues analysis, resume writing, scientific presentations and public speaking in crop and soil sciences.

201 Forage Crops
Fall. 3(2-2)
Forage crop production, management, and utilization. Crop identification. Soil fertilization. Planting and harvesting of grasses and legumes.

202 The World of Turf
Fall. 2(1-2)
Role of turf in society and the environment. Principles underlying establishment and maintenance of turf on athletic fields, parks, home lawns, and golf courses. Aesthetic, safety, and economic aspects of turfgrass management practices.

203 Applied Turf Management
Fall. 1(1-0) P: CSS 202 or concurrently Not open to students with credit in CSS 232.
Principles and practices for establishing and maintaining turf in residential and commercial lawns. Field trips required.

210 Fundamentals of Soil Science
Fall, Spring. 3(2-3) RB: CEM 141
Agricultural and natural resource ecosystems: soil, vegetation, and ground water components. Energy, water, and nutrient cycles. Soil classification and mapping. Land management and use issues.

212 Advanced Crop Production
Fall. 2(2-0) P: CSS 101 RB: CSS 210 and CSS 110
Systems approach to production of field crops including corn, soybeans, small grains, sugar beets, and dry beans.

222 New Horizons in Biotechnology
Fall. 2(2-0) Interdepartmental with Entomology. Administered by Crop and Soil Sciences.
Perspectives on biotechnology for safer food production, environmental quality, and improved human health. Impacts of biotechnology on the national economy. Political and ethical ramifications of applied biotechnology.

232 Turfgrass Management
Fall. 4(3-2) P: CSS 210 or concurrently RB: CSS 110 or CSE 101
Turfgrass utilization, identification, establishment and management principles. Responses to various cultural practices.

251 Organic Farming Principles and Practices
Spring. 3(3-0) Interdepartmental with Horticulture. Administered by Horticulture.
History and principles of organic farming. Farms as ecological systems. Certification process and agencies. Organic matter management, the soil food web, and nutrient availability. Biodiversity, crop rotations, plant competition, ground cover, and plant health. Integrating crops and animals. Organic animal husbandry. Field trip required.

262 Turfgrass Management Seminar
Fall. 1(2-0) A student may earn a maximum of 2 credits in all enrollments for this course. P: CSS 232 or concurrently
Presentations by turf students and industry professionals. Topics include internship experiences, technical expertise, and keys to successful career pathways.

264 Golf Course Design and Construction Techniques
Fall. 2(2-0) P: CSS 210 and CSS 232 and CSS 267 SA: CSS 164
Concepts and theory of golf course design and construction including location, space, topography, clientele, and environmental concerns.

267 Performance Turf Design and Construction
Spring. 2(2-2) P: CSS 232
Performance turfgrass design, construction, renovation and establishment principles.

269 Turfgrass Strategies: Integration and Synthesis
Spring. 2(3-0) P: CSS 232 and CSS 267
Issues in turfgrass management including employee relations, cultural, and environmental problems. Offered first ten weeks of semester.

272 Turfgrass Soil Fertility
Spring. 2(3-0) RB: CSS 210 SA: CSS 044, CSS 342
Soil-plant relationships, soil acidity and alkalinity, macro- and micro-nutrients, fertilizer materials, soil fertility, evaluations, and fertilizer programming. Offered first ten weeks of semester.

290 Independent Study in Crop and Soil Science
Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 6 credits in all enrollments for this course. R: Open only to students in the Institute of Agricultural Technology. SA: CSS 057 Not open to students with credit in CSS 057.
Field, laboratory, or library research problems.

292 Management of Turfgrass Weeds
Fall. 3(2-2) P: CSS 232 RB: PLB 105
Chemical, biological, and cultural methods of managing cool- and warm-season turfgrass weeds. Environmental considerations in weed management.

294 Issues in International Agriculture
Spring. 1(1-0) SA: CSS 494
Global issues related to food production, soil resources and sustainability of agriculture in developing and developed countries.

302 Principles of Weed Management
Fall. 3(2-2) P: CSS 101 or PLB 105 or BS 161 or HRT 203 or CSS 232
Cultural, mechanical, biological, and chemical weed management principles and practices. Environmental considerations.

330 Soil Chemistry
Spring. 2(2-2) P: CSS 210 and CEM 143
Organic and inorganic soil processes including mineralogy, adsorption, desorption, and precipitation. Chemistry of soil organic matter and inorganic soil components.

340 Applied Soil Physics
Spring. 2(2-2) P: CSS 210
Soil physical properties including solids, water, air, and heat. Transport processes in soil.

350 Introduction to Plant Genetics
Spring. 3(4-0) P: PLB 105 or BS 161 R: Not open to freshmen or sophomores.
Fundamentals of plant genetics with applications to agriculture and natural resources.

360 Soil Biology
Fall. 3(2-2) P: CSS 210 RB: CSS 330
Overview of organismal diversity and biological soil processes. Role of macroorganisms and microorganisms in soil processing, including nutrient cycling.

382 Turfgrass Physiology
Spring. 2(3-0) Interdepartmental with Horticulture. Administered by Crop and Soil Sciences. P: (CSS 232) Completion of Tier I writing requirement. RB: PLB 105 SA: CSS 282, CSS 068 Not open to students with credit in CSS 332.
Physiological principles of turfgrass growth and development. Water relations, light, temperature, respiration, photosynthesis, mineral nutrition, and hormone action. Impact of mowing, cultivation, and traffic on turfgrass growth. Offered first ten weeks of semester.

424 Sustainable Agriculture and Food Systems: Integration and Synthesis
Fall. 3(3-0) Interdepartmental with Environmental Studies and Agriscience and Horticulture. Administered by Crop and Soil Sciences. P: CSS 124 RB: (CSS 101 or CSS 360 or CSS 431 or ENT 479 or HRT 203 or HRT 251 or HRT 341 or EEP 255 or EEP 260 or ESA 343) or (ESA 444 or GEO 410) R: Open to juniors or seniors or graduate students.
Biogeochemical and socio-economic aspects of food, fiber, and fuel production. Environmental impacts and social context. Experiential learning projects.

425 Microbial Ecology
Spring. 3(3-0) Interdepartmental with Microbiology and Molecular Genetics. Administered by Microbiology and Molecular Genetics. RB: MMG 301 SA: MPH 425
Microbial population and community interactions. Microbial activities in natural systems, including associations with plants or animals.

426 Biogeochemistry
Summer. 3 credits. Interdepartmental with Geological Sciences and Microbiology and Molecular Genetics and Zoology. Administered by Microbiology and Molecular Genetics. RB: (BS 110 or LBS 144 or LBS 148H or BS 111 or LBS 145 or LBS 149H) and (CEM 143 or CEM 251) SA: MPH 426
Integration of the principles of ecology, microbiology, geochemistry, and environmental chemistry. Societal applications of research in aquatic and terrestrial habitats.

431 International Agricultural Systems
Spring. 3(3-0) P: ANR 250 or EEP 260 or ISS 310 or ISS 315 or ISS 318 or ISS 320 or ISS 330A or ISS 330B or ISS 330C or ISS 336 R: Not open to freshmen.
World production capacity for food, fiber and biofuel as related to soil, biology and climatic resources. Principles and case studies of sustainable systems presented from developing and developed countries. Emerging issues in agricultural globalization and biodiversity.

441 Plant Breeding and Biotechnology
Spring of even years. 3(3-0) Interdepartmental with Forestry and Horticulture. Administered by Crop and Soil Sciences. P: CSS 101
Plant improvement by genetic manipulation. Genetic variability in plants. Traditional and biotechnological means of creating and disseminating recombinant genotypes and cultivars. Importance of plant breeding to our food system, economy, and environment.

442 Agricultural Ecology
Fall. 3(3-0) R: Open to juniors or seniors or graduate students.
Ecological principles in the design and management of agricultural ecosystems. Integration of ecological factors regulating crop and rangeland productivity.

445 Evolution (W)
Fall. 3(3-0) Interdepartmental with Plant Biology and Zoology. Administered by Zoology. P: (ZOL 341 or CSS 350) and completion of Tier I writing requirement R: Not open to freshmen. SA: ZOL 345
Processes of evolutionary change in animals, plants. Microbes. Population genetics, microevolution, speciation, adaptive radiation, macroevolution. Origin of Homo sapiens.

451 Biotechnology Applications for Plant Breeding and Genetics
Spring. 3(2-2) Interdepartmental with Forestry and Horticulture. Administered by Crop and Soil Sciences. RB: (CSS 350 or ZOL 341) and CSS 441
Principles, concepts, and techniques of agricultural plant biotechnology. Recombinant DNA technology, plant molecular biology and transformation in relation to plant improvement.

452 Watershed Concepts
Fall, Spring, Summer. 3(3-0) Interdepartmental with Biosystems Engineering and Environmental Studies and Agriscience and Forestry and Fisheries and Wildlife. Administered by Environmental Studies and Agriscience. P: ESA 324 and ZOL 355 RB: organic chemistry SA: RD 452
Watershed hydrology and management. The hydrologic cycle, water quality, aquatic ecosystems, and social systems. Laws and institutions for managing water resources.

455 Pollutants in the Soil Environment
Fall. 3(3-0) P: (CEM 143) and completion of Tier I writing requirement. R: Open only to seniors or graduate students.
Chemical and biological reactions of organic and inorganic pollutants in soils.

464 Statistics for Biologists
Fall. 3(3-0) Interdepartmental with Animal Science and Statistics and Probability. Administered by Statistics and Probability. RB: STT 421
Biological random variables. Estimation of population parameters. Testing hypotheses. Linear correlation and regression. Analyses of counted and measured data to compare several biological groups including contingency tables and analysis of variance.

467 BioEnergy Feedstock Production
Fall. 3(3-0) Interdepartmental with Biosystems Engineering and Forestry. Administered by Crop and Soil Sciences. P: MTH 103 or MTH 116 RB: CSS 101 and CSS 210
Agronomic, economic, technological, and environmental principles involved in bioenergy feedstock production. Cultivation, harvest, transportation, and storage of agricultural and forest biomass.

470 Soil Resources
Fall. 3(2-3) RB: CSS 210 R: Not open to freshmen or sophomores.
Evaluation of the properties, genesis, and classification of soil resources to assist in making land-use decisions.

477 Pest Management I: Pesticides in Management Systems
Fall of even years. 3(3-0) Interdepartmental with Entomology and Fisheries and Wildlife and Horticulture. Administered by Entomology. RB: (CEM 143 or CEM 251) and (PLP 405 and CSS 402) and (ENT 404 or ENT 470) R: Open to juniors or seniors or graduate students.
Chemistry, modes of action, and environmental fate of pesticides. Product development and regulation. Social aspects of pesticide use.

478 Pest Management II: Biological Components of Management Systems (W)
Spring of even years. 3(2-3) Interdepartmental with Entomology and Forestry and Fisheries and Wildlife and Horticulture. Administered by Entomology. P: (ENT 404 or ENT 470 or PLP 405 or CSS 402) and completion of Tier I writing requirement
Principles of host plant resistance and biological control and their relationship to the design of agroecosystems. Classification of insect biological control agents.

480 Soil Fertility and Management
Fall. 3(3-0) P: CSS 101 and CSS 330 and CSS 340 and CSS 360 and (CSS 470 or concurrently)
Comprehensive management of agricultural soils. Soil fertility, including liming and fertilizer materials and other nutrient sources. Site specific soil management. Environmental impacts including soil erosion, runoff, and organic matter mineralization.

486 Biotechnology in Agriculture: Applications and Ethical Issues
Fall of even years. 3(3-0) Interdepartmental with Forestry and Horticulture and Philosophy. Administered by Horticulture. P: BS 161 or PLB 105 RB: CSS 350 or ZOL 341 R: Not open to freshmen or sophomores.
Current and future roles of biotechnology in agriculture: scientific basis, applications. Environmental, social, and ethical concerns.

488 Agricultural Cropping Systems: Integration and Problem Solving
Spring. 3(2-2) P: (CSS 101 and CSS 210) and completion of Tier I writing requirement. RB: (CSS 310 and CSS 430 and PLP 405 and ENT 404) and Course work in crop production and management. R: Open only to seniors in the College of Agriculture and Natural Resources.
Integration and synthesis of agronomic and related concepts in agricultural cropping systems. Problem solving and application of information.

490 Independent Study
Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 8 credits in all enrollments for this course. P: CSS 101 or CSS 210 R: Approval of department; application required.
Individual work on field, laboratory, or library research problem of special interest to the student.

491 Special Topics
Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 8 credits in all enrollments for this course. P: CSS 101 or CSS 210
Topics from crop production, crop physiology, turfgrass management, organic soils, turfgrass soils, soil fertility, plant and soil relationships, genetics, biotechnology, environmental science, or sustainable agriculture.

492 Professional Development Seminar II
Fall. 1(0-2) P: (CSS 192 or CSS 262) and (CSS 210 and completion of Tier I Writing requirement) R: Open only to seniors in the Department of Crop and Soil Sciences.
Synthesis, integration and application of agronomic principles to current issues in agronomy via discussion and oral and written communication.

493 Professional Internship in Crop and Soil Sciences
Fall, Spring, Summer. 3 credits. A student may earn a maximum of 6 credits in all enrollments for this course. A student may earn a maximum of 6 credits in all enrollments for any or all of these courses: ABM 493, AEE 493, ANR 493, ANS 493, CMP 493, CSS 493, EEP 493, ESA 493, FIM 493, FSC 493, FW 493, HRT 493, PKG 493, PLP 493 and PRR 493. P: Completion of Tier I writing requirement. R: Approval of department; application required.
Supervised professional experiences in agencies and businesses related to crop and soil sciences and environmental soil sciences.

499 Undergraduate Research
Fall, Spring, Summer. 3(0-9) R: Approval of department; application required.
Faculty supervised research in a selected area of crop and soil sciences or environmental soil science.

802 Weed Biology
Spring of even years. 2(2-0) RB: A previous course in weed science or plant biology or ecology.
Weed biology, including weed seed production and dispersal and seed fate. Weed life history traits and ecophysiology, including invasive species. Data collection in weed ecology research.

805 Herbicide Action and Metabolism
Spring of odd years. 2(2-0)
Properties and characteristics of herbicides. Processes involved in herbicide action, transport, and fate in plants and soils.

814 Advanced Statistics for Biologists
Spring. 4(3-2) Interdepartmental with Animal Science and Statistics and Probability. Administered by Statistics and Probability. RB: STT 464
Concepts of reducing experimental error for biological and agricultural research. Covariance, randomized block designs, latin squares, split plots, repeated-measures designs, regression applications, and response surface designs. Analyses using statistical software.

819 Advanced Plant Breeding
Fall of even years. 3(3-0) Interdepartmental with Forestry and Horticulture. Administered by Horticulture. RB: STT 422 and ZOL 341
Genetic expectations resulting from breeding strategies with cross- and self-pollinated crop plants. Germplasm collections, mapping populations, and modifications of reproductive biology useful for crop improvement.

820 Plant Reproductive Biology and Polyploidy
Spring of odd years. 1(3-0) Interdepartmental with Forestry and Horticulture and Plant Biology and Plant Pathology. Administered by Horticulture. RB: Introductory Genetics and Plant Biology
Genetic processes underlying variations in plant reproductive biology and polyploidy. Utilization of these characteristics in plant breeding.

821 Crop Evolution
Spring of odd years. 1 credit. Interdepartmental with Forestry and Horticulture and Plant Biology and Plant Pathology. Administered by Horticulture. RB: Introductory Genetics and Plant Biology
Cultural and biological aspects of the evolution of domestic plants.

822 Historical Geography of Crop Plants
Spring of odd years. 1 credit. Interdepartmental with Forestry and Horticulture and Plant Biology and Plant Pathology. Administered by Horticulture. RB: Introductory Genetics and Plant Biology
Development and spread of the major crop species.

840 Soil Physics
Fall of odd years. 3(2-3) R: Open only to graduate students in the College of Agriculture and Natural Resources or College of Engineering or College of Natural Science.
Physical properties of soil including texture, structure, consistency, aeration, moisture content, and temperature. Quantitative measurement of plant growth. Agronomic and engineering practices.

842 Population Genetics, Genealogy and Genomics
Fall. 3(3-0) Interdepartmental with Animal Science and Forestry and Fisheries and Wildlife and Genetics and Horticulture. Administered by Forestry. RB: Pre-calculus, basic genetics
Population genetic processes underlying patterns of molecular genetic variation. Genealogical approaches to the study of genomic diversity, phylogenetic reconstruction, and molecular ecology.

850 Soil Chemistry
Spring. 3(3-3) R: Open only to graduate students in the College of Agriculture and Natural Resources or College of Engineering or College of Natural Science.
Ion activities, ionic exchange and equilibrium reactions. Soil pH, macro- and micronutrients, saline soils and availability of nutrients to plants.

853 Plant Mineral Nutrition
Fall of odd years. 3(3-0) Interdepartmental with Horticulture. Administered by Crop and Soil Sciences. RB: PLB 301
Inorganic ion transport in plant cells and tissues. Physiological responses and adaptation to problem soils. Genetic diversity in nutrient uptake and use by plants. Physiological roles of elemental nutrients in crop growth.

856 Plant Molecular and Omic Biology
Spring. 3(3-0) Interdepartmental with Biochemistry and Molecular Biology and Plant Biology. Administered by Plant Biology. RB: ZOL 341 SA: BOT 856
Recent advances in genetics and molecular biology of higher plants.

863 Mineral-Water Interactions
Fall of even years. 4(3-2) Interdepartmental with Geological Sciences. Administered by Geological Sciences. R: Open only to graduate students in the Department of Crop and Soil Sciences or Department of Geological Sciences or Department of Geography.
Mineralogy, petrology and geochemistry of fluid-rock reactions in geologic, sedimentary and geochemical cycles. Rock and mineral weathering, soil formation, genesis and burial diagenesis of sediments and sedimentary rocks, and metamorphism.

865 Environmental Fate of Organic Contaminants in Soils
Spring of even years. 3(3-0) RB: Undergraduate level coursework in general and organic chemistry, and introductory microbiology
Chemistry and biology of toxicants in soils as determinants of environmental fate.

880 Scientific Communication and Professional Development
Spring. 1(0-2)
Interactive professional experiences including grant preproposal preparation and presentation, scientific presentations, mock position interviews, and resume preparation.

890 Independent Study
Fall, Spring, Summer. 1 to 6 credits. A student may earn a maximum of 8 credits in all enrollments for this course. R: Open only to graduate students in the College of Agriculture and Natural Resources or College of Engineering or College of Natural Science.
Individual study on field, laboratory, or library research.

891 Current Topics in Ecology and Evolution
Summer. 1 to 2 credits. A student may earn a maximum of 10 credits in all enrollments for this course. Interdepartmental with Plant Biology and Zoology. Administered by Zoology.
Presentation and critical evaluation of theoretical and empirical developments in ecology and evolutionary biology by visiting scientists.

891B Selected Topics in Plant Breeding and Genetics
Fall, Spring, Summer. 1 to 2 credits. A student may earn a maximum of 6 credits in all enrollments for this course. Interdepartmental with Forestry and Horticulture. Administered by Horticulture. R: Open only to graduate students in the Plant Breeding and Genetics major or Genetics major. Approval of department.
Selected topics in plant breeding.

892 Plant Breeding and Genetics Seminar
Fall, Spring, Summer. 1(1-0) A student may earn a maximum of 8 credits in all enrollments for this course. Interdepartmental with Forestry and Horticulture. Administered by Horticulture.
Experience in review, organization, oral presentation, and analysis of research.

892B Ecological Food and Farming Systems Seminar
Fall, Spring. 1 credit. Interdepartmental with Community, Agriculture, Recreation and Resource Studies. Administered by Crop and Soil Sciences.
Experiential learning, and multidisciplinary and applied research, in ecological food and farming systems.

893 Selected Topics
Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 6 credits in all enrollments for this course. R: Open only to graduate students in the College of Agriculture and Natural Resources or College of Engineering or College of Natural Science.
Selected topics in crop and soil sciences of current interest and importance.

899 Master's Thesis Research
Fall, Spring, Summer. 1 to 12 credits. A student may earn a maximum of 99 credits in all enrollments for this course. R: Open only to master's students in the Department of Crop and Soil Sciences.
Master's thesis research.

921 Geostatistics
Fall of odd years. 3(3-0) RB: Statistical methods or approval of department. Working knowledge of SAS software.
Spatial variability analysis. Variogram models. Kriging and cokriging. Field experiments with spatial trends. Longitudinal data. Modeling in the presence of spatial and temporal correlations.

941 Quantitative Genetics in Plant Breeding
Spring of even years. 3(2-2) Interdepartmental with Forestry and Horticulture. Administered by Crop and Soil Sciences. RB: CSS 819 and STT 464
Theoretical and genetic basis of statistical analysis of quantitative traits using genetic markers. Computational tools for the study of quantitative traits.

999 Doctoral Dissertation Research
Fall, Spring, Summer. 1 to 24 credits. A student may earn a maximum of 99 credits in all enrollments for this course. R: Open only to doctoral students in the Department of Crop and Soil Sciences.
Doctoral dissertation research.