CROP AND SOIL SCIENCES

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

101 Introduction to Crop Science
Fall, 3(2-2)

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 CSS 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.

135 Crop Scouting and Investigation
Spring, 2(3-0) P:M: CSS 101
Crop production, pest scouting and other production problems, and field diagnoses. Interaction with agriculture clientele.

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.

156 Weed Management
Fall, 3(2-2) R: Open only to freshmen or sophomores. Not open to students in Crop and Soil Sciences.
Cultural, mechanical, biological, and chemical weed management practices in agronomic crops.

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.

178 Golf Turf Irrigation
Spring, 2(2-2) Not open to students with credit in CSS 078.
Golf course irrigation systems: installation and maintenance including water management.

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.

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)

210 Fundamentals of Soil Science
Fall, Spring, 3(2-3) RB: CEM 141

211 Turfgrass and the Environment
Spring, 2(3-0) P:M: CSS 232 RB: CSS 210
Pesticide and nutrient fate, site assessment, fuel use, equipment washing systems and criteria for recognizing sensitive sites. Conservation and best management practices to maximize protection of natural resources.

212 Advanced Crop Production
Fall, 2(2-0) P:M: 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 Introduction to Turfgrass Management
Fall, 3(2-2) P:M: CSS 210 or concurrently RB: CSS 110 or CSE 101
Turfgrass utilization, identification, establishment and management principles. Responses to various cultural practices.

242 Athletic Field Maintenance and Construction
Fall, 2(2-0) P:M: (CSS 232 or concurrently) and (CSS 210 or concurrently)
Maintenance, renovation, and construction of athletic fields with emphasis on baseball and football. Soil testing, cultivar selection, and surveying. Safety and liability concerns.

262 Turfgrass Management Seminar
Fall, 1(2-0) A student may earn a maximum of 2 credits in all enrollments for this course.
P:M: 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:M: 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 Turfgrass Practices
Spring, 2(2-2) P:M: CSS 232 SA: CSS 067
Turfgrass establishment, renovation, and construction principles. Maintenance of golf course turf. Agronomic and management principles applied to golf course maintenance.

269 Turfgrass Strategies
Spring, 2(3-0) P:M: CSS 232
Issues in turfgrass management including employee relations, construction, and environmental problems.

272 Turfgrass Soil Management
Fall, 3(2-2) RB: CSS 043 or CSS 210 Not open to students with credit in CSS 044 or CSS 342
Impact of fertilization programs on turfgrasses and the environment. Irrigation, drainage, cultivation, topdressing, amendments and pH control of turfgrass soils.

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 projects.

292 Management of Turfgrass Weeds
Spring, 2(2-2) P:M: CSS 232 RB: BOT 105
Chemical, biological, and cultural methods of managing turfgrass weeds. Environmental considerations in weed management.

310 Soil Management and Environmental Impact
Spring, 3(3-0) P:M: CSS 210
Management of soil physical and chemical properties for the production of food and fiber. Soil management systems that reduce the environmental impact on soil, water and air resources and maximize crop production potential.

330 Soil Chemistry
Spring, 2(2-2) P:M: 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:M: 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:M: BOT 105 or BS 111 R: Not open to freshmen or sophomores.
Fundamentals of plant genetics with applications to agriculture and natural resources.

355 Environmental Soil Chemistry
Fall, 3(2-2) P:M: (CEM 143 and CSS 210)
Soil chemistry concepts as they apply to major chemical groups of environmental importance including metals, nitrogen, phosphorus, organic contaminants, and pesticides.

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

362 Management of Turfgrass Pests
Chemical, biological, and cultural methods of managing weeds, diseases, and insect pests of turfgrass. Environmental considerations in pest management.
Crop and Soil Sciences—CSS

380 Crop Physiology
Spring of even years. 3(2-3) P:M: CSS 101 and (BOT 105 or BOT 301)
Physiological and metabolic function of plants from a whole plant viewpoint. Environmental effects on crop growth, development, and yield.

382 Turfgrass Physiology
Spring. 2(3-0) Interdepartmental with Horticulture. Administered by Crop and Soil Sciences. P:M: (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.

425 Microbial Ecology
Spring. 3(0-3) 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 (CEN 143 or CEN 251) SA: MPH 426
Integration of the principles of ecology, microbiology, geochemistry, and environmental chemistry. Societal applications of research in aquatic and terrestrial habitats.

430 Soil Fertility and Chemistry
Spring. 3(2-2) P:M: CSS 210 R: Not open to freshmen or sophomores.
Application of chemistry to diagnosing and improving soil fertility. Soil amendments including macro and micro-nutrients. Reducing environmental degrada
dation.

431 Soil and Plant Resources for Sustained World Food and Fiber Production
Fall of odd years. 3(3-0) P:M: CSS 101 and CSS 210
World food and fiber production capacities related to soil and climatic resources. Management and utilization of genetic resources for sustained production of human foods and animal feeds.

440 Soil Biophysics
Fall of even years. 3(2-2) P:M: CSS 210 R: Not open to freshmen or sophomores.
Plant growth properties and soil physical conditions which influence productivity. Principles and applications of soil texture, structure, mechanical impedance, aeration and water. Root responses to the environment.

441 Plant Breeding and Biotechnology
Spring of even years. 3(3-0) Interdepartmental with Forestry and Horticulture. Administered by Crop and Soil Sciences. P:M: 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.

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.

455 Pollutants in the Soil Environment
Fall. 3(3-0) P:M: (CEN 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.

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. 3(3-0) Interdepartmental with Entomology and Fisheries and Wildlife and Horticulture. Administered by Entomology. RB: (CEN 143 or CEN 251) and (BOT 405 and CSS 402) and (ENT 404 or ENT 470 or FW 328)
Chemistry, efficient use, and environmental fate of pesticides. Legal and social aspects of pesticide use.

478 Pest Management II: Biological Components of Management Systems (W)
Spring of even years. 3(3-2) Interdepartmental with Entomology and Forestry and Fisheries and Wildlife and Horticulture. Administered by Entomology. P:M: (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(0-3) P:M: 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(3-3) Interdepartmental with Entomology and Forestry and Horticulture and Philosophy. Administered by Horticulture. P:M: BOT 105 or BS 111 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:M: (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:M: 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 6 credits in all enrollments for this course. P: M: 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: M: (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. P: M: Completion of Tier I writing requirement. R: Approval of department; application required. A student may earn a maximum of 6 credits for any or all of these courses: ABM 493, AEE 493, ANR 493, ANS 493, CSS 493, EEP 493, FIMA 493, FW 493, HRT 493, PKG 493, PLP 493, PRR 493, and RD 493. Supervised professional experiences in agencies and businesses related to crop and soil sciences and environmental soil sciences.

494 International Agriculture Seminar
Spring of odd years. 1(1-0) A student may earn a maximum of 3 credits in all enrollments for this course. P: M: Completion of Tier I writing requirement. R: Approval of department; application required. Global food, soil and water resources issues.

499 Undergraduate Research
Fall, Spring, Summer. 30(0-9) R: Approval of department; 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) R: 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

819 Advanced Plant Breeding
Fall. 3(3-0) Interdepartmental with Forestry and Horticulture. Administered by Horticulture. RB: CSS 450 and STT 422
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.

825 Clay Mineralogy and Soils Genesis
Spring of even years. 4(3-2) Interdepartmental with Geologic Sciences. Administered by Crop and Soil Sciences. R: Open only to graduate students in the College of Agriculture and Natural Resources or College of Engineering or College of Natural Science.
Mineral structures. X-ray diffraction, pedogenic processes, and mineral transformations and stability.

827 Techniques in Cytogenetics
Fall of odd years. 1(0-3) Interdepartmental with Forestry and Horticulture. Administered by Crop and Soil Sciences.
Preparation of chromosomes from commercially important plants for cytogenetic analysis.

837 Confocal Microscopy
Fall, Spring. 2(2-0) Interdepartmental with Natural Science. Administered by Natural Science.

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.

841 Soil Microbiology
Spring of even years. 3(3-0) Interdepartmental with Microbiology and Molecular Genetics. Administered by Microbiology and Molecular Genetics. RB: MMG 425 SA: MPH 841
Ecology, physiology, and biochemistry of microorganisms indigenous to soil.

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

850 Soil Chemistry
Spring of odd years. 3(3-0) Interdepartmental with Horticulture. Administered by Crop and Soil Sciences. RB: BOT 301

856 Plant Molecular Biology
Spring. 3(3-0) Interdepartmental with Biochemistry and Molecular Biology and Plant Biology. Administered by Plant Biology. RB: 20L 341 SA: BOT 856
Recent advances in genetics and molecular biology of higher plants.

865 Organic Chemistry of Soils
Spring of odd years. 2(2-0) Chemistry of natural and anthropogenic organic substances in soils.
870 Techniques of Analyzing Unbalanced Research Data
Spring. 4(0-4) Interdepartmental with Animal Science and Forestry and Fisheries and Wildlife and Horticulture. Administered by Animal Science. RB: STT 464 R: Open only to graduate students in the College of Agriculture and Natural Resources. SA: ANS 943
Linear model techniques to analyze biological research data characterized by missing and unequal number of observations in classes. Simultaneous consideration of multiple factors. Prediction of breeding values and estimation of population parameters from variance and covariance components.

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.

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 Contemporary Statistical Models in Biology
Fall of odd years. 3(3-0) RB: (STT 465) or approval of department. Working knowledge of SAS software.

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.