CSS—Crop and Soil Sciences

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) R: Open only to students in Crop and Soil Sciences. Principles of crop production including crop and soil management and improvement. International and sustainable agriculture. Water quality issues.

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 in CSE 101. Use of computers in agriculture. Basic computer operating systems. Management and use of storage media. Laboratory experience in word processing, spreadsheet use, data bases, programming languages, networking, and software related to agriculture.

135 Crop Scouting and Investigation
Spring, 2(3-0) P: 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 078. Budgeting. Financial analysis. Purchasing and materials management for golf course operations.

178 Golf Turf Irrigation
Spring, 2(2-2) R: 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) Forage crop production, management, and utilization. Crop identification. Soil fertilization. Planting and harvesting of grasses and legumes.

210 Fundamentals of Soil Science

211 Turfgrass and the Environment
Spring, 2(3-3) P: 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(2-2) P: CSS 101 RB: CSS 210 and Spring, 2(2-2) P: CSS 232 RB: BOT 105 Systems approach to production of field crops including corn, soybeans, small grains, sugar beets, and dry beans.

222 New Horizons in Biotechnology

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

242 Athletic Field Maintenance and Construction
Fall, 2(2-2) P: (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 surveys. Safety and liability concerns.

262 Turfgrass Management Seminar
Fall, 2(2-2) 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 184 Concepts and theory of golf course design and construction including location, space, topography, clientele, and environmental concerns.

267 Turfgrass Practices

269 Turfgrass Strategies
Spring, 2(3-0) P: 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, top dressing, 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: CSS 210 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: CSS 210 Management of soil physical, chemical, and environmental 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: 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: 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, 2(2-2) P: 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: 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
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 292, 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.

402 Principles of Weed Science
Fall. 3(2-2) RB: BOT 105 and CEM 143 R:
Not open to freshmen or sophomores.
Weed biology and ecology. Cultural, mechanical,
biological, and chemical control practices. Herbicide
action, selectivity in plants, and effects on environ-
ment.

404 Forest and Agricultural Ecology
Fall. 3(3-0) Interdepartmental with Forestry. Administered by Forestry. P:M: CSS 210
and (BOT 105 or BS 110) RB: ZOL 355
Ecological interactions crucial to the sustainable
management of crop and forest ecosystems. Plant
resources, competition, community development
and dynamics, biodiversity, primary productivity,
nutrient cycling, ecosystem structure and function,
and impacts of global environmental change.

404L Forest and Agricultural Ecology
Laboratory
Fall. 1(0-3) Interdepartmental with Forestry. Administered by Forestry. P:M: CSS 210
and (BOT 105 or BS 110) and (FOR 404 or
concurrently) RB: ZOL 355
Field studies and data analysis of ecological
processes central to the sustainable management of
forest and agricultural resources. Field exercises
cover primary production, community structure, soil
resources, biodiversity, succession, nutrient cycling,
critiques of primary literature. Two weekend field
trips required.

406 Seed Production and Technology
Fall of even years. 3(2-2) P:M: CSS 101 and
CSS 350 R: Not open to freshmen or so-
phomores.
Principles and practices of field seed production.
Crop improvement, variety release, seed production,
seed technology and evaluation involved in produc-
ing high quality field crop seed.

426 Biogeochemistry
Summer. 3 credits. Interdepartmental with
Geological Sciences and Microbiology and
Molecular Genetics and Zoology. Adminis-
tered by Microbiology and Molecular Genet-
ics. RB: (BS 110 or LBS 144 or LBS 149H
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. Societ-
al 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 improv-
ing soil fertility. Soil amendments including macro-
and micro-nutrients. Reducing environmental degra-

dation.

431 Soil and Plant Resources for Sustained
World Food and Fiber Production
Spring 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 util-
ization 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 applica-
tions of soil texture, structure, mechanical imped-
ance, aeration and water. Root responses to the
environment.

441 Plant Breeding and Biotechnology
Spring of even years. 3(3-0) Interdepart-
mental with Forestry and Horticulture. Ad-
ministered 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 breed-
ing to our food system, economy, and environment.

451 Biotechnology Applications for Plant
Breeding and Genetics
Spring. 3(2-2) Interdepartmental with Fore-
stry 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 rela-
tion to plant improvement.

455 Pollutants in the Soil Environment
Fall. 3(3-0) P:M: (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. Ad-
ministered by Statistics and Probability. RB:
STT 421
Biological random variables. Estimation of popula-
tion parameters. Testing hypotheses. Linear correla-
tion and regression. Analyses of counted and meas-
ured data to compare several biological groups
including contingency tables and analysis of va-
riance.

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

477 Pest Management I: Pesticides in
Management Systems
Fall. 3(3-0) Interdepartmental with Entomol-
ogy and Fisheries and Wildlife and Horticulture.
Administered by Entomology. RB: (CEM 143 or CEM 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(2-3) Interdepart-
mental with Entomology and Forestry and
Aquaculture. Administered by Entomology and
Fisheries and Wildlife and Horticulture. Ad-
ministered 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 agro-
ecosystems. 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 timing and fertilizer materials
and other nutrient sources. Site specific soil man-
agement. 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 Philoso-
phy. 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 agricul-
ture: 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 pro-
duction 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; ap-

plication required.
Individual work on field, laboratory, or library re-
search problem of special interest to the student.
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
Development and spread of the major crop species.

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
Global food, soil and water resources issues.

825 Clay Mineralogy and Soils Genesis
Spring of even years. 4(3-2) Interdepartmental with Geological Sciences. Administered by Plant Biology. RB: Introductory Genetics and Plant Biology
Preparation of chromosomes from commercially important plants for cytogenetic analysis.

830 Herbs Research Seminar
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.
Supervised research experiences for graduate students in the Department of Crop and Soil Sciences.

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

837 Confocal Microscopy
Fall, Spring. 2(2-2) 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. Administered by Crop and Soil Sciences.
Chemical and physical processes affecting mineral transformations and stability. Soil testing and soil water management.

841 Soil Microbiology
Fall 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 Plant Nutrition
Fall of odd years. 3(3-0) Interdepartmental with Animal Science and Forestry and Fisheries and Wildlife and Genetics and 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: BOT 301 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 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(4-0) 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 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.
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. 1(1-0) A student may earn an amount 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.