101 Introduction to Crop Science  
Fall, 3(2-2) R: Open to undergraduate students or agricultural technology students. 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) R: Open to agricultural technology students in the Agricultural Industries Major. SA: AEE 105  
Preparation for academic and professional success. Introduction to opportunities in the agriculture industry.

110 Computer Applications in Agronomy  
Fall, 2(1-2) R: Open to undergraduate students or agricultural technology 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, spreadsheets, databases, programming languages, networking, and software related to agriculture.

120 Issues in Food and Agriculture  
Fall, 3(3-0) R: Open to undergraduate students or agricultural technology students. Current and historical issues impacting food and agriculture.

124 Introduction to Sustainable Agriculture and Food Systems  
Fall, Spring, 2(3-0) Interdepartmental with Animal Science and Environmental Studies and Agriscience and Horticulture. Administered by Crop and Soil Sciences. R: Open to undergraduate students or agricultural technology students. 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 R: Open to undergraduate students or agricultural technology students. 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(2-0) R: Open to undergraduate students or agricultural technology students. 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 SA: CSS 071  

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 to students in the Department of Plant, Soil and Microbial 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) R: Open to undergraduate students or agricultural technology students. Forage crop production, management, and utilization; crop identification; soil fertilization; planting and harvesting of grasses and legumes.

202 World of Turf  
Fall, Spring, Summer, 2(2-0) Not open to students with credit in CSS 232. 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.

202L World of Turf Lab  
Fall, 1(0-2) P: CSS 202 or concurrently Not open to students with credit in CSS 232.  

210 Fundamentals of Soil Science  
Fall, Spring, 3(2-3) RB: CEM 141 R: Open to undergraduate students or agricultural technology students. 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 R: Open to undergraduate students or agricultural technology students. 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) R: Open to undergraduate students or agricultural technology students. 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(3-0) 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  

262 Turfgrass Management Seminar  
Fall, 2(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.

282 Turfgrass Physiology  
Spring, 2(3-0) P: CSS 232 (Completion of Tier I writing requirement. RB: PLB 105 SA: CSS 382, CSS 068, 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.

288 Principles of Weed Management  
Fall, 3(2-0) P: CSS 101 or PLB 105 or BS 161 or HRT 203 or CSS 232 or LB 145 R: Open to undergraduate students or agricultural technology students. SA: CSS 402, CSS 156, CSS 302  
Cultural, mechanical, biological, and chemical weed management principles and practices. Environmental considerations. Field trips required.
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: (PLP 405 and ENT 404) and Course work in crop production and management. R: Open to seniors in the Agronomy minor or in the Crop and Soils Sciences major. Integration and synthesis of agronomic and related concepts in agricultural cropping systems. Problem solving and application of information.

Independent Study
Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 6 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.

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: 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.

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 to seniors in the Department of Plant, Soil and Microbial Sciences Synthesis, integration and application of agronomic principles to current issues in agronomy via discussion and oral and written communication.

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 any or all of these courses: ABM 493, ANR 493, ANS 493, CPM 493, CSS 493, CSUS 493, EEP 493, FIM 493, FSC 493, FW 493, HRT 493, PKG 493, and PLP 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.

Undergraduate Research
Fall, Spring, Summer. 30-0-9 R: Approval of department; application required. Faculty supervised research in a selected area of crop and soil sciences or environmental soil science.

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.

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.

Advanced Statistics for Biologists

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.

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.

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.

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.

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

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.

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

Plant Mineral Nutrition
Fall of odd years. 3(3-0) Interdepartmental with Horticulture. Administered by Horticulture. 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.

Plant Molecular and Organic 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.

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.

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

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.

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.
Crop and Soil Sciences—CSS

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 to graduate students in the College of Agriculture and Natural Resources or in the College of Engineering or in the 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 to masters students in the Department of Plant, Soil and Microbial 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 36 credits in all enrollments for this course. R: Open to doctoral students in the Department of Plant, Soil and Microbial Sciences.
Doctoral dissertation research.