DEPARTMENT OF SOIL AND CROP SCIENCES

Office in Plant Sciences Building, Room C127
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https://soilcrop.agsci.colostate.edu (http://soilcrop.colostate.edu)

Dr. Mark Brick, Department Head

Undergraduate

Majors

• Major in Soil and Crop Sciences
  • Agronomic Production Management Concentration
  • Applied Information Technology Concentration
  • International Soil and Crop Sciences Concentration
  • Plant Biotechnology, Genetics, and Breeding Concentration
  • Soil Ecology Concentration
  • Soil Restoration and Conservation Concentration

Minors

• Minor in Soil Resources and Conservation
• Minor in Soil Science
• Organic Agriculture Interdisciplinary Minor

Graduate

Graduate Programs in Soil and Crop Sciences

Programs in crop science, soil science, or plant genetics lead to Master of Science and Doctor of Philosophy degrees. Students interested in graduate work should refer to the Graduate and Professional Bulletin and the Department of Soil and Crop Sciences. (http://soilcrop.agsci.colostate.edu)

Master Programs

Master of Science in Soil and Crop Sciences, Plan A*

Ph.D.

Ph.D. in Soil and Crop Sciences*

* Please see department for program of study.

Courses

Soil and Crop Sciences (SOCR)

SOCR 100 General Crops Credits: 4 (3-2-0)
Course Description: Production and adaptation of cultivated crops; principles affecting growth, development, management, and utilization.
Prerequisite: None.
Registration Information: Must register for lecture and laboratory.
Term Offered: Fall.
Grade Mode: Traditional.
Special Course Fee: No.

SOCR 171 Environmental Issues in Agriculture (GT-SS3) Credits: 3 (2-0-1)
Also Offered As: HORT 171.
Course Description: Historical development of agriculture; environmental consequences of modern food production and other cultural approaches to agriculture.
Prerequisite: None.
Registration Information: Must register for lecture and recitation. Credit not allowed for both SOCR 171 and HORT 171.
Term Offered: Fall.
Grade Mode: Traditional.
Special Course Fee: No.
Additional Information: Global & Cultural Awareness 3E, Human Behavior, Culture, or Social Frameworks (GT-SS3).

SOCR 177 Applied Information Technology in Agriculture Credit: 1 (0-0-1)
Course Description: Introduction to database and project management, GIS/GPS and remote sensing, as they apply to agriculture, the environment, and business management.
Prerequisite: None.
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.

SOCR 192 Water in the West Credits: 3 (0-0-3)
Course Description: History and current status of water resources management and policy in the western United States.
Prerequisite: None.
Term Offered: Fall.
Grade Mode: Traditional.
Special Course Fee: No.

SOCR 200 Seed Anatomy and Identification Credit: 1 (0-2-0)
Course Description: Principles of seed anatomy including reproduction, identification, and seed characteristics of plant families.
Prerequisite: BZ 104 or BZ 110 or BZ 120 or HORT 100 or LIFE 102 or SOCR 100.
Terms Offered: Fall, Spring, Summer.
Grade Mode: Traditional.
Special Course Fee: No.
SOCR 201 Seed Development and Metabolism Credit: 1 (0-2-0)
Course Description: Basic processes controlling seed development, maturation, dormancy, storage, germination, and how these factors relate to seedling growth.
Prerequisite: BZ 104 or BZ 110 or BZ 120 or HORT 100 or LIFE 102 or SOCR 100.
Registration Information: Sections may be offered: Online.
Terms Offered: Fall, Spring, Summer.
Grade Mode: Traditional.
Special Course Fee: No.

SOCR 240 Introductory Soil Science Credits: 4 (3-2-0)
Course Description: Formation, properties, and management of soils emphasizing soil conditions that affect plant growth.
Prerequisite: CHEM 107 or CHEM 111.
Registration Information: Must register for lecture and laboratory.
Terms Offered: Fall, Spring.
Grade Mode: Traditional.
Special Course Fee: No.

SOCR 300 Seed Purity Analysis Credits: 2 (0-4-0)
Course Description: Fundamentals for determining physical purity of a seed lot using established rules and procedures.
Prerequisite: SOCR 200.
Registration Information: Written consent of instructor. Sections may be offered: Online.
Terms Offered: Fall, Spring, Summer.
Grade Mode: Traditional.
Special Course Fee: No.

SOCR 301 Seed Germination and Viability Credits: 2 (0-4-0)
Course Description: Seed viability tests including standard germination and tetrazolium, seed viability, dormancy, parameters of viability and evaluation.
Prerequisite: SOCR 201.
Registration Information: Written consent of instructor. Sections may be offered: Online.
Terms Offered: Fall, Spring, Summer.
Grade Mode: Traditional.
Special Course Fee: No.

SOCR 310 Agronomic Plant and Seed Identification Credits: 2 (0-4-0)
Course Description: Evaluate characteristics needed to identify agronomic plant and seed species.
Prerequisite: BZ 104 or BZ 110 or BZ 120 or HORT 100 or LIFE 102 or SOCR 100.
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.

SOCR 320 Forage and Pasture Management Credits: 3 (3-0-0)
Course Description: Fundamentals of establishment, management, and utilization of cultivated forages including hay, silage, and pasture production.
Prerequisite: None.
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: Yes.

SOCR 322 Principles of Microclimatology Credits: 3 (3-0-0)
Course Description: Principles of microclimatology including energy balance concepts for soil and vegetation surfaces, and their application.
Prerequisite: PH 100 to 499 - at least 3 credits.
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.

SOCR 330 Principles of Genetics Credits: 3 (3-0-0)
Course Description: Transmission, population, and molecular genetics; practical applications.
Prerequisite: BZ 110 or BZ 120 or LIFE 102.
Terms Offered: Fall, Spring, Summer.
Grade Mode: Traditional.
Special Course Fee: No.

SOCR 341 Microbiology for Sustainable Agriculture Credit: 1 (1-0-0)
Course Description: Functional roles and management of soil organisms in organic agriculture, emphasis on ecological interactions with plants and plant pathogens.
Prerequisite: SOCR 240.
Term Offered: Spring (even years).
Grade Mode: Traditional.
Special Course Fee: No.

SOCR 342 Organic Soil Fertility Credit: 1 (1-0-0)
Course Description: Organic soil fertility management in framework of holistic organic farming system.
Prerequisite: SOCR 240 and SOCR 341 and SOCR 350.
Term Offered: Fall (even years).
Grade Mode: Traditional.
Special Course Fee: No.

SOCR 343 Composting Principles and Practices Credit: 1 (1-0-0)
Course Description: Fundamentals of compost production, use, and regulation.
Prerequisite: SOCR 240 and SOCR 350.
Term Offered: Fall (odd years).
Grade Mode: Traditional.
Special Course Fee: Yes.

SOCR 344 Crop Development Techniques Credits: 2 (2-0-0)
Course Description: Conventional and transgenic approaches to crop variety development.
Prerequisite: BZ 120 or LIFE 102 or LIFE 103.
Term Offered: Spring (even years).
Grade Mode: Traditional.
Special Course Fee: No.
SOCR 345  Diagnosis and Treatment in Organic Fields  Credits: 2 (0-4-0)

Also Offered As: HORT 345.

Course Description: Field experience in diagnosis of pest and nutrient problems on organic farms and development of treatment recommendations.

Prerequisite: (BSPM 302 or BSPM 308 or BSPM 361) and (HORT 100 or SOCR 100) and (SOCR 240).

Registration Information: Credit not allowed for both SOCR 345 and HORT 345. Required field trips.

Term Offered: Summer (even years).

Grade Mode: Traditional.

Special Course Fee: Yes.

SOCR 350  Soil Fertility Management  Credits: 3 (3-0-0)

Course Description: Managing soil fertility and fertilizers to meet plant nutrient requirements in an environmentally sound manner with emphasis on nutrient cycling.

Prerequisite: SOCR 350, may be taken concurrently.

Term Offered: Fall.

Grade Mode: Traditional.

Special Course Fee: No.

SOCR 351  Soil Fertility Laboratory  Credit: 1 (0-2-0)

Course Description: Soil chemical analyses and development of fertilizer recommendations for crops.

Prerequisite: SOCR 350, may be taken concurrently.

Term Offered: Fall.

Grade Mode: Traditional.

Special Course Fee: Yes.

SOCR 370  Irrigation Principles  Credits: 2 (2-0-0)

Course Description: Determination of irrigation water requirements based on the estimation of storage and movement of water in the soil-plant-atmospheric system.

Prerequisite: (HORT 100 or SOCR 100 or BZ 120) and (SOCR 240).

Term Offered: Spring.

Grade Mode: Traditional.

Special Course Fee: No.

SOCR 371  Irrigation of Field Crops  Credit: 1 (1-0-0)

Course Description: Management of irrigation systems for field crops with emphasis on irrigation methods, irrigation scheduling and strategies for water conservation.

Prerequisite: SOCR 370.

Registration Information: Required field trips.

Term Offered: Fall.

Grade Mode: Traditional.

Special Course Fee: No.

SOCR 377  Geographic Information Systems in Agriculture  Credits: 3 (2-2-0)

Course Description: Introduction to geographic information systems and global positioning systems with applications to agriculture.

Prerequisite: SOCR 100 to 499 - at least 3 credits or CS 100 to 499 - at least 3 credits.

Registration Information: Credit not allowed for both SOCR 377 and SOCR 577. Required field trips.

Term Offered: Fall.

Grade Modes: S/U within Student Option, Trad within Student Option.

Special Course Fee: Yes.

SOCR 384  Supervised College Teaching  Credits: Var[1-5] (0-0-0)

Course Description:

Prerequisite: None.

Registration Information: A maximum of 10 combined credits for all 384 and 484 courses are counted towards graduation requirements.

Terms Offered: Fall, Spring, Summer.

Grade Mode: Instructor Option.

Special Course Fee: No.

SOCR 400  Soils and Global Change: Science and Impacts  Credits: 3 (2-2-0)

Course Description: Introduction to greenhouse gas estimation methods and mitigation project development in the land use sector.

Prerequisite: SOCR 240, may be taken concurrently.

Registration Information: Required field trips. Sections may be offered: Online.

Term Offered: Fall.

Grade Mode: Traditional.

Special Course Fee: No.

SOCR 401  Greenhouse Gas Mitigation, Land Use, and Mgmt  Credits: 3 (2-3-0)

Course Description: Introduction to greenhouse gas estimation methods and mitigation project development in the land use sector.

Prerequisite: SOCR 240.

Registration Information: Required field trips.

Term Offered: Fall.

Grade Mode: Traditional.

Special Course Fee: No.

SOCR 410  Seed Processes: Storage and Deterioration  Credit: 1 (0-0-1)

Course Description: Environmental conditions and management factors influencing storage and deterioration of seeds, including physiological and biochemical changes.

Prerequisite: BZ 104 or BZ 105 or BZ 120.

Registration Information: Offered as an online course only.

Terms Offered: Fall, Spring, Summer.

Grade Mode: Traditional.

Special Course Fee: No.

SOCR 411  Large Seeded Legume Seed Production  Credit: 1 (1-0-0)

Course Description: Principles for seed production of large-seeded legume crops with emphasis on common bean, peanut, and soybean.

Prerequisite: BZ 104 or BZ 105 or BZ 120.

Registration Information: Offered as an online course only.

Terms Offered: Fall, Spring.

Grade Mode: Traditional.

Special Course Fee: No.

SOCR 412  Seed Processes: Separation and Conditioning  Credit: 1 (1-0-0)

Course Description: Understanding the physical process required to separate pure seed from contaminants and maintain viability.

Prerequisite: BZ 104 or BZ 105 or BZ 120.

Registration Information: Offered as an online course only.

Terms Offered: Fall, Spring, Summer.

Grade Mode: Traditional.

Special Course Fee: No.
SOCR 415 Pollinator Management in Agroecosystems  Credits: 2 (2-0-0)
Also Offered As:  BSPM 415.
Course Description: Fundamental concepts of pollinator biology and management, sustainable crop-pollinator interactions, regional and global issues on pollinator management and conservation, best management practices for commercially managed pollinators.
Prerequisite:  HORT 100 or SOCR 100.
Registration Information:  Junior standing. Credit not allowed for both SOCR 415 and BSPM 415. Required field trips.
Term Offered:  Spring (odd years).
Grade Mode:  Traditional.
Special Course Fee:  No.

SOCR 420 Crop and Soil Management Systems I  Credits: 3 (3-0-0)
Course Description: Principles of crop, soil management emphasizing environmental factors influencing crop growth and development, interactions with soil organic matter.
Prerequisite:  (HORT 100 or SOCR 100) and (SOCR 240).
Term Offered:  Spring.
Grade Mode:  Traditional.
Special Course Fee:  No.

SOCR 421 Crop and Soil Management Systems II  Credits: 4 (3-2-0)
Course Description: Principles of crop and soil management with emphasis on soil erosion control, water conservation, and plant-water relationships.
Prerequisite:  (HORT 100 or SOCR 100) and (SOCR 240).
Registration Information:  Must register for lecture and laboratory.
Term Offered:  Fall.
Grade Mode:  Traditional.
Special Course Fee:  Yes.

SOCR 424 Topics in Organic Agriculture  Credits: 3 (3-0-0)
Also Offered As:  HORT 424.
Course Description: Examination of issues specific to organic food production systems and marketing.
Prerequisite:  (AREC 202 or ECON 202) and (AREC 328 and SOCR 240) and (HORT 100 or SOCR 100) and (SOCR 171 or HORT 171).
Registration Information:  Credit not allowed for both SOCR 424 and HORT 424.
Term Offered:  Spring (even years).
Grade Mode:  Traditional.
Special Course Fee:  No.

SOCR 430 Applications of Plant Biotechnology  Credits: 3 (3-0-0)
Course Description: Current and potential applications of DNA-based biotechnology in crop agriculture and other plant disciplines.
Prerequisite:  SOCR 330.
Term Offered:  Fall (even years).
Grade Mode:  Traditional.
Special Course Fee:  No.

SOCR 440 Pedology  Credits: 4 (2-3-1)
Course Description: Process of soil formation, characterization, classification of soils; soil survey methods.
Prerequisite:  None.
Registration Information:  Must register for lecture, laboratory and recitation.
Term Offered:  Fall.
Grade Modes:  S/U within Student Option, Trad within Student Option.
Special Course Fee:  Yes.

SOCR 441 Soil Ecology  Credits: 3 (2-3-0)
Course Description: An integrative, hands-on experience in the theory and application of ecology principles to the soil environment.
Prerequisite:  SOCR 455.
Term Offered:  Spring.
Grade Mode:  Traditional.
Special Course Fee:  No.

SOCR 442 Forest and Range Soils  Credits: 3 (3-0-0)
Course Description: Soil and water relationships in forest and rangeland ecosystems; significant properties in their management.
Prerequisite:  None.
Term Offered:  Spring.
Grade Modes:  S/U within Student Option, Trad within Student Option.
Special Course Fee:  No.

SOCR 455 Soil Microbiology  Credits: 3 (3-0-0)
Course Description: Microbial activities in agricultural, forest, and grassland soils; in soil-plant relationships; and in maintenance of environmental quality.
Prerequisite:  MIP 300 or SOCR 240.
Term Offered:  Fall.
Grade Modes:  S/U within Student Option, Trad within Student Option.
Special Course Fee:  No.

SOCR 456 Soil Microbiology Laboratory  Credit: 1 (0-3-0)
Course Description: Techniques used in study of ecology and activities of soil microorganisms.
Prerequisite:  SOCR 455, may be taken concurrently.
Term Offered:  Fall.
Grade Modes:  S/U within Student Option, Trad within Student Option.
Special Course Fee:  No.

SOCR 460 Plant Breeding  Credits: 3 (2-0-1)
Also Offered As:  HORT 460.
Course Description: Theory and practice of plant breeding using principles of genetics and related sciences.
Prerequisite:  BZ 350, may be taken concurrently or LIFE 201A, may be taken concurrently or SOCR 330, may be taken concurrently.
Registration Information:  Must register for lecture and recitation. Credit not allowed for both SOCR 460 and HORT 460.
Term Offered:  Fall (odd years).
Grade Mode:  Traditional.
Special Course Fee:  No.

SOCR 461 Plant Breeding Laboratory  Credit: 1 (0-3-0)
Also Offered As:  HORT 461.
Course Description: Techniques and procedures used in public and commercial plant breeding programs.
Prerequisite:  SOCR 460, may be taken concurrently or HORT 460, may be taken concurrently.
Registration Information:  Credit not allowed for both SOCR 461 and HORT 461.
Term Offered:  Fall (odd years).
Grade Modes:  S/U within Student Option, Trad within Student Option.
Special Course Fee:  No.

SOCR 467 Soil and Environmental Chemistry  Credits: 3 (3-0-0)
Course Description: Fundamental principles of soil chemistry with respect to environmental reactions between soils and other natural materials and priority pollutants.
Prerequisite:  CHEM 335.
Term Offered:  Spring.
Grade Mode:  Traditional.
Special Course Fee:  No.
SOCR 470  Soil Physics  Credits: 3 (3-0-0)
Course Description: Physical properties of soils emphasizing mechanical composition, moisture, aeration, temperature, and structure related to management, plant growth.
Prerequisite: SOCR 240 or GEOL 232.
Term Offered: Fall.
Grade Modes: S/U within Student Option, Trad within Student Option.
Special Course Fee: No.

SOCR 471  Soil Physics Laboratory  Credit: 1 (0-3-0)
Course Description: Familiarization of techniques and equipment used in evaluation of soil physical properties.
Prerequisite: SOCR 470, may be taken concurrently.
Term Offered: Fall.
Grade Mode: S/U Sat/Unsat Only.
Special Course Fee: No.

SOCR 475  Global Challenges in Plant and Soil Science  Credits: 3 (3-0-0)
Course Description: Evaluation of case studies to define problems and develop solutions to address global challenges in plant and soil science.
Prerequisite: (SOCR 240 or GEOL 122) and (LIFE 102 or BZ 120).
Term Offered: Spring (even years).
Grade Modes: S/U within Student Option, Trad within Student Option.
Special Course Fee: No.

SOCR 477  Environmental Soil Sciences  Credits: 3 (3-0-0)
Course Description: Chemical, biological, and physical aspects of prevention and remediation of soil and water pollution; environmental impact assessment.
Prerequisite: SOCR 470 and SOCR 467, may be taken concurrently.
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.

SOCR 478  Environmental Soil Science Laboratory  Credit: 1 (0-3-0)
Course Description: Laboratory and field studies of soil and groundwater contamination, including monitoring and remediation.
Prerequisite: SOCR 478, may be taken concurrently.
Registration Information: Required field trips.
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.

SOCR 486  Practicum  Credits: Var[1-4] (0-0-0)
Course Description: Directed experiences in the application of soil and crop science principles.
Prerequisite: None.
Registration Information: Written consent of instructor.
Terms Offered: Fall, Spring, Summer.
Grade Mode: Instructor Option.
Special Course Fee: No.

SOCR 487  Internship  Credits: Var[1-12] (0-0-0)
Course Description:
Prerequisite: None.
Terms Offered: Fall, Spring, Summer.
Grade Mode: Instructor Option.
Special Course Fee: No.

SOCR 490  Hydrus-1D Workshop  Credit: 1 (0-0-1)
Course Description: Using Hydrus-1D software for flow and transport of water, heat, and chemicals in soil.
Prerequisite: SOCR 470.
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.

SOCR 492  Seminar  Credit: 1 (0-0-1)
Course Description:
Prerequisite: None.
Term Offered: Fall.
Grade Mode: Instructor Option.
Special Course Fee: No.

SOCR 495  Independent Study  Credits: Var[1-18] (0-0-0)
Course Description:
Prerequisite: None.
Terms Offered: Fall, Spring, Summer.
Grade Mode: Instructor Option.
Special Course Fee: No.

SOCR 496  Group Study  Credits: Var[1-18] (0-0-0)
Course Description:
Prerequisite: None.
Terms Offered: Fall, Spring, Summer.
Grade Mode: Instructor Option.
Special Course Fee: No.

SOCR 498  Undergraduate Research  Credits: Var[1-6] (0-0-0)
Course Description: Research in soil and crop sciences.
Prerequisite: None.
Registration Information: Written consent of instructor.
Terms Offered: Fall, Spring, Summer.
Grade Mode: Traditional.
Special Course Fee: No.

SOCR 500  Environmental Measurement Laboratory  Credit: 1 (0-2-0)
Course Description: A hands-on instrumentation lab for making environmental, weather, and soil measurements using low-cost microcontroller boards and sensors.
Prerequisite: PH 110.
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.

SOCR 514  Agricultural Experimental Design and Analysis  Credits: 4 (3-3-0)
Also Offered As: STAT 514.
Course Description: Design and implementation of agricultural experiments and statistical analysis of resulting data.
Prerequisite: STAT 201 or STAT 301 or STAT 307 or ERHS 307.
Registration Information: Must register for lecture and laboratory. Credit allowed for only one of the following: SOCR 414, SOCR 514, STAT 302, or STAT 514.
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.

SOCR 522  Micrometeorology  Credits: 3 (3-0-0)
Course Description: Microenvironments; physics of environmental variables; plant canopy microclimate; evapotranspiration; surface-atmosphere exchange; instrumentation.
Prerequisite: PH 100 to 499 - at least 3 credits.
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.
SOCR 530  Scientific Writing  Credit: 1 (1-0-0)  
Also Offered As: BSPM 530.  
Course Description: Skills necessary to prepare complete scientific journal articles including writing, editing, and literature searching and assessment.  
Prerequisite: None.  
Registration Information: Credit not allowed for both SOCR 530 and BSPM 530.  
Term Offered: Spring.  
Grade Mode: Instructor Option.  
Special Course Fee: No.  

SOCR 535 Origin and Evolution of Cultivated Plants  Credits: 3 (3-0-0)  
Course Description: Origin of crops from viewpoints of archaeology, history, botany, and taxonomy, and continued evolution of plants under cultivation.  
Prerequisite: SOCR 330.  
Term Offered: Fall (even years).  
Grade Modes: S/U within Student Option, Trad within Student Option.  
Special Course Fee: No.  

SOCR 540 Soil-Plant-Nutrient Relationships  Credits: 3 (3-0-0)  
Course Description: Soil and plant factors affecting nutrient uptake, mechanistic models of uptake, availability and functions of essential elements, diagnostic techniques.  
Prerequisite: SOCR 350.  
Term Offered: Spring (even years).  
Grade Modes: S/U within Student Option, Trad within Student Option.  
Special Course Fee: No.  

SOCR 550 Advanced Soil Genesis  Credits: 3 (3-0-0)  
Course Description: Modern concepts of specific mechanisms involved in formation of genetic soil groups and their relationship to environmental factors.  
Prerequisite: SOCR 440.  
Term Offered: Spring (even years).  
Grade Modes: S/U within Student Option, Trad within Student Option.  
Special Course Fee: No.  

SOCR 567 Environmental Soil Chemistry  Credits: 4 (3-0-1)  
Course Description: The chemistry of terrestrial environments and the interactions of soil constituents with bacteria, nutrients, and pollutants.  
Prerequisite: CHEM 335.  
Registration Information: Credit not allowed for SOCR 467 and SOCR 567.  
Term Offered: Spring.  
Grade Mode: Traditional.  
Special Course Fee: No.  

SOCR 570 Plant Breeding for Drought Tolerance  Credit: 1 (1-0-0)  
Course Description: Principles and practices of evaluation, selection and cultivar development for crops in drought-stress environments with an emphasis on agronomic crops.  
Prerequisite: SOCR 330 and SOCR 460.  
Registration Information: Offered as an online course only.  
Term Offered: Fall.  
Grade Mode: Traditional.  
Special Course Fee: No.  

SOCR 571 Foundations of Soil Science  Credits: 2 (2-0-0)  
Course Description: Importance of soils in ecology and earth system science with regard to the study and management of the soil resource.  
Prerequisite: SOCR 240.  
Term Offered: Spring.  
Grade Mode: Traditional.  
Special Course Fee: No.  

SOCR 577 Principles/Components: Precision Agriculture  Credits: 3 (2-2-0)  
Course Description: Principles and components of precision agriculture, including GPS, GIS, remote sensing, and their applications in soil and crop management.  
Prerequisite: SOCR 100 to 499 - at least 3 credits or CS 100 to 499 - at least 3 credits.  
Registration Information: Must register for lecture and laboratory. Credit not allowed for both SOCR 577 and SOCR 377. Required field trips.  
Term Offered: Fall.  
Grade Mode: Traditional.  
Special Course Fee: Yes.  

SOCR 620 Modeling Ecosystem Biogeochemistry  Credits: 3 (2-3-0)  
Course Description: Design and build biogeochemical process and ecosystem models with GUI-based software. Analyze and test models and interpret experimental data.  
Prerequisite: [ECOL 505 or LAND 220 or LIFE 220 or SOCR 240] and (MATH 155 or MATH 160).  
Restriction: Must be a: Graduate, Professional.  
Term Offered: Fall (odd years).  
Grade Mode: Traditional.  
Special Course Fee: No.  

SOCR 640 Crop Physiology  Credit: 1 (1-0-0)  
Course Description: Developmental, physiological, and biochemical determinants of crop yields as controlled by genetic and environmental effects.  
Prerequisite: BZ 440.  
Restriction: Must be a: Graduate, Professional.  
Term Offered: Fall (odd years).  
Grade Mode: Traditional.  
Special Course Fee: No.  

SOCR 650 Research Proposal Development  Credit: 1 (1-0-0)  
Course Description: Skills to develop and write an effective scientific research proposal.  
Prerequisite: None.  
Restriction: Must be a: Graduate, Professional.  
Registration Information: Graduate standing.  
Term Offered: Fall.  
Grade Mode: Traditional.  
Special Course Fee: No.  

SOCR 670 Terrestrial Ecosystems Isotope Ecology  Credits: 3 (2-2-0)  
Course Description: Isotope distribution in biogeochemical cycles, research topics in biosphere-atmosphere interactions; lab experience with isotope techniques.  
Prerequisite: None.  
Restriction: Must be a: Graduate, Professional.  
Registration Information: Must register for lecture and laboratory. Required field trips.  
Term Offered: Spring (even years).  
Grade Mode: Traditional.  
Special Course Fee: No.  

SOCR 675 Presentations for Scientific Audiences  Credit: 1 (1-0-0)  
Course Description: Organization and presentation of scientific information to audiences in oral and poster format.  
Prerequisite: None.  
Restriction: Must be a: Graduate, Professional.  
Term Offered: Fall.  
Grade Mode: Traditional.  
Special Course Fee: No.
SOCR 699 Thesis Credits: Var[1-18] (0-0-0)
Course Description:
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Terms Offered: Fall, Spring, Summer.
Grade Mode: Instructor Option.
Special Course Fee: No.

SOCR 720 Advanced Plant Breeding Credits: 4 (4-0-0)
Course Description: Systems of mating and selection in plants to maximize genetic gain. Evaluation of heterosis, germplasm diversity, strategies, and new technologies.
Prerequisite: (SOCR 460 or HORT 460) and (STAT 100 to 499 - at least 3 credits).
Restriction: Must be a: Graduate, Professional.
Term Offered: Spring (odd years).
Grade Mode: Traditional.
Special Course Fee: No.

SOCR 720A Advanced Plant Breeding: Methods Credits: 2 (2-0-0)
Course Description: Historical perspectives in plant breeding, plant reproduction, genetic gain, breeding and selection systems in self- and cross-pollinated plants.
Prerequisite: (SOCR 460 or HORT 460) and (STAT 100 to 799 - at least 3 credits).
Restriction: Must be a: Graduate, Professional.
Term Offered: Spring (odd years).
Grade Mode: Traditional.
Special Course Fee: No.

SOCR 720B Advanced Plant Breeding: Tools Credits: 2 (2-0-0)
Course Description: Plant breeding strategies, genotype x environment interaction, field plot and genomic tools, breeding for pest resistance, stress tolerance, quality.
Prerequisite: (SOCR 460 or HORT 460) and (STAT 100 to 799 - at least 3 credits).
Restriction: Must not be a: Graduate, Professional.
Term Offered: Fall (odd years).
Grade Mode: Traditional.
Special Course Fee: No.

SOCR 725 Quantitative Inheritance in Plant Breeding Credits: 3 (2-2-0)
Course Description: Quantitative genetic structure of populations, recognition of genetic, environmental variance. Methods of dealing with quantitatively inherited traits.
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Registration Information: Must register for lecture and laboratory.
Term Offered: Spring (even years).
Grade Mode: Traditional.
Special Course Fee: No.

SOCR 730 Topics in Plant Breeding and Genetics Credit: 1 (1-0-0)
Course Description: Current literature regarding mechanisms used for plant improvement.
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Term Offered: Fall.
Grade Mode: Traditional.
Special Course Fee: No.

SOCR 731 Plant Breeding Data Management Credit: 1 (1-0-0)
Course Description: Principles and best practices for optimal data management for plant breeding and other data-intensive research programs.
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Registration Information: Must have taken three credits in computer science.
Term Offered: Fall (even years).
Grade Mode: Traditional.
Special Course Fee: No.

SOCR 740 Plant Molecular Genetics Credits: 3 (3-0-0)
Also Offered As: BSPM 740.
Course Description: Advances in study of organization and function of nuclear and organellar genomes, gene expression in higher plants, and plant-microbe interactions.
Prerequisite: BC 351 and SOCR 330.
Restriction: Must be a: Graduate, Professional.
Registration Information: Credit not allowed for both SOCR 740 and BSPM 740.
Term Offered: Fall (odd years).
Grade Mode: Traditional.
Special Course Fee: No.

SOCR 745 Advanced Soil Microbiology Credits: 3 (3-0-0)
Course Description: Ecology of soil microorganisms emphasizing population and activity relationships, nitrogen fixation, and microbe-pesticide interactions.
Prerequisite: MIP 624 or SOCR 455.
Restriction: Must be a: Graduate, Professional.
Term Offered: Spring (even years).
Grade Modes: S/U within Student Option, Trad within Student Option.
Special Course Fee: No.

SOCR 755 Advanced Soil Physics Credits: 3 (3-0-0)
Course Description: Surface chemistry of soils, electrical double layer models of surface charge and potential, colloid stability, computer modeling of adsorption.
Prerequisite: (CHEM 100 to 481 - at least 4 courses and CS 100 to 481 - at least 1 course) and (MATH 141 or MATH 155 or MATH 160).
Restriction: Must be a: Graduate, Professional.
Term Offered: Fall (odd years).
Grade Modes: S/U within Student Option, Trad within Student Option.
Special Course Fee: No.

SOCR 760 Advanced Soil Chemistry Credits: 3 (3-0-0)
Course Description: Description and analysis of principles of storage and movement of water, solutes, heat, and gases in soils.
Prerequisite: MATH 261 or SOCR 470.
Restriction: Must be a: Graduate, Professional.
Registration Information: Must register for lecture and laboratory.
Term Offered: Spring (even years).
Grade Mode: Traditional.
Special Course Fee: No.

SOCR 770 Advanced Molecular Genetics Credits: 4 (3-2-0)
Course Description: Description and analysis of principles of storage and movement of water, solutes, heat, and gases in soils.
Prerequisite: MATH 261 or SOCR 470.
Restriction: Must be a: Graduate, Professional.
Registration Information: Must register for lecture and laboratory.
Term Offered: Spring (even years).
Grade Mode: Traditional.
Special Course Fee: No.

SOCR 784 Supervised College Teaching Credits: Var[1-18] (0-0-0)
Course Description:
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Terms Offered: Fall, Spring, Summer.
Grade Mode: Instructor Option.
Special Course Fee: No.
SOCR 792  Seminar  Credit: 1 (0-0-1)
Course Description:
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Terms Offered: Fall, Spring.
Grade Mode: Instructor Option.
Special Course Fee: No.

SOCR 795  Independent Study  Credits: Var[1-18] (0-0-0)
Course Description:
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Terms Offered: Fall, Spring, Summer.
Grade Mode: Instructor Option.
Special Course Fee: No.

SOCR 796  Group Study  Credits: Var[1-18] (0-0-0)
Course Description:
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Terms Offered: Fall, Spring, Summer.
Grade Mode: Instructor Option.
Special Course Fee: No.

SOCR 799  Dissertation  Credits: Var[1-18] (0-0-0)
Course Description:
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Terms Offered: Fall, Spring, Summer.
Grade Mode: Instructor Option.
Special Course Fee: No.