

# SCSC - SOIL AND CROP SCIENCES

## SCSC 605 Pedology

**Credits 3. 3 Lecture Hours.** Soil genesis, morphology and classification; development of a working knowledge of soil taxonomy and diagnostic horizons used in placement of soils. **Prerequisites:** SCSC 301 or equivalent; or approval of instructor. Two 2-day field trips for which departmental fees may be assessed to cover costs.

## SCSC 607 Crop Physiology

**Credits 3. 3 Lecture Hours.** Growth and productivity of major agronomic crops as related to plant physiological processes and environmental parameters, including manipulation of crop growth for enhanced production. **Prerequisites:** SCSC 303; MEPS 313.

## SCSC 610 Host Plant Resistance

**Credits 3. 3 Lecture Hours.** Host plant resistance programs from the standpoint of the plant breeder, plant pathologist and entomologist; team taught with each discipline represented; roundtable discussion of assigned readings and lectures. **Prerequisite:** Approval of instructor. **Cross Listing:** ENTO 610 and PLPA 610.

## SCSC 611 Introduction to Environmental Biophysics

**Credits 4. 3 Lecture Hours. 2 Lab Hours.** Theoretical and experimental analysis of interactions between living organisms and their environments; measurement and modeling of the physical environment; measurement and modeling of energy and mass transfer between organisms and their environments, and of organism response to fluxes of mass and energy. **Prerequisites:** Graduate classification and approval of instructor.

## SCSC 613 Ethical Aspects of International Agricultural Systems

**Credits 3. 3 Lecture Hours. 0 Lab Hours.** Diverse theories of morality; ethical dimensions of population growth, high yielding crop production systems, genetic engineering, and use of land, soil, and water. **Prerequisites:** Approval of instructor.

## SCSC 615 Reclamation of Drastically Disturbed Lands

**Credits 3. 3 Lecture Hours.** Theoretical and practical aspects of reclamation of lands disturbed during mining of lignite, uranium, phosphorous, oil shale and other minerals and disturbances due to industrial activities; emphasis on physical and chemical characteristics of disturbed materials and their impact on establishment of permanent vegetation. **Prerequisite:** SCSC 301 or approval of instructor.

## SCSC 618 Analysis of Environmental Systems

**Credits 2. 1 Lecture Hour. 2 Lab Hours.** Classical and contemporary methods for analyzing chemical components of environmental systems, soil, water, plants and gases; environmental chemistry coupled with experiential. **Prerequisite:** Graduate classification.

## SCSC 619 Molecular Methods for Microbial Characterization

**Credits 3. 2 Lecture Hours. 2 Lab Hours.** Underlying principles of molecular methods for microbial detection and characterization in natural and man-made ecosystems; emphasis on method application and data interpretation; emphasis on microbial pathogens and indicator organisms in foods and environment; laboratory covers select protocols. **Prerequisites:** FSTC 326/ANSC 326; SCSC 405; POSC 429; approval of instructor. **Cross Listing:** FSTC 619, POSC 619 and VTMI 619.

## SCSC 620 Brazilian Agriculture and Food Production Systems

**Credits 3. 3 Lecture Hours.** Compare Brazilian and U.S. agriculture and culture related to soil, water, and forest conservation and management in Brazil; tour and learn about Amazon River, rain forest, Brasilia, farm, ranch, and floral production systems, agricultural cooperatives and research, sugar and alcohol production, phosphate mining and production; visit points of interest. **Prerequisite:** Approval of instructor.

## SCSC 621 International Agricultural Research Centers - MX

**Credits 3. 3 Lecture Hours.** Introduction to international agricultural research, Consultative Group on International Agriculture activity; modern and underdeveloped tropical agricultural systems; introduction to Mexican culture; critical evaluation of complex and international agricultural issues and research programs. **Prerequisites:** Approval of instructor; graduate classification.

## SCSC 624 Soil Chemistry

**Credits 3. 3 Lecture Hours.** Chemistry of clay minerals, inorganic solid phases, and organic colloids in soil; mass transfer reactions in soils: absorption/desorption, precipitation/dissolution, gas/liquid phase exchange; principles of soil acidity and salinity; introduction to application of equilibrium concepts in soils. **Prerequisites:** SCSC 301 or approval of instructor.

## SCSC 626 Soil Mineralogy

**Credits 3. 3 Lecture Hours.** Crystal structures and properties of important minerals in soils and sediments especially clay minerals and oxides combined with identification techniques involving theory and practice with x-ray diffraction, electron microscopy, infrared and chemical methods.

## SCSC 627 Soil Chemistry and Fertility

**Credits 3. 3 Lecture Hours.** Chemical and biological behavior of nitrogen, phosphorus and potassium in soils; secondary nutrients, micronutrients and soil acidity and liming; interpretation of soil chemical/biochemical research from historical and current literature and relationships with nutrient availability, plant uptake, and environmental quality. **Prerequisites:** SCSC 422; MEPS 313.

## SCSC 628 Soil Mineralogy Lab

**Credits 2. 4 Lab Hours.** Mineral identification and quantification techniques involving theory and practice with x-ray diffraction, electron microscopy (SEM and TEM). Fourier transform infrared spectroscopy and chemical methods. **Prerequisite:** SCSC 626.

## SCSC 629/VTMI 629 Laboratory Quality Systems

**Credits 3. 3 Lecture Hours.** Quality systems and method development used within a laboratory; ensuring the integrity of procedures used in lab processes, chain of custody, information management, and international laboratory standards; regulatory requirements for laboratory operation; bio-security precautions; laboratory management. **Cross Listing:** VTMI 629/SCSC 629.

## SCSC 634 Regulatory Science Principles

**Credits 3. 3 Lecture Hours.** Regulatory tools, standards and practices to improve the protection and compliance of regulated systems; interdependence of regulatory agencies; models of risk analysis with emphasis on conducting a qualitative and quantitative risk assessment; and implications of compliance.

## SCSC 635 Comparative Global Standards in Food Systems

**Credits 3. 3 Lecture Hours.** Laws, regulations and standards governing the production, distribution, processing and marketing of food across regions of the world; international standard setting bodies and risk assessment committees; regulatory equivalency and harmonization; product approval procedures; cost/benefits of global standards and trade agreements.

## SCSC 636 Regulatory Science: Methodology in Food Systems

**Credits 3. 3 Lecture Hours.** Risk management methodology including investigation of food and feed firms, conducting internal compliance audits; sample collection, chain-of-custody, trace-back and trace-forward, recalls, label review, data interpretation, risk ranking, resource prioritization, incident command and rapid response. **Prerequisite:** SCSC 634.

## SCSC 638 Hazard Analysis and Preventive Controls for Animal Food

**Credits 3. 3 Lecture Hours.** Application of hazard analysis and risk-based preventive controls; Science-based approach to identify and manage hazards in feed ingredients and finished feed; Development of a written food safety plan to protect animal and human health that align with Food and Drug Administration (FDA) rules and regulations and Hazard Analysis and Critical Control Point (HACCP) principles.

## SCSC 639 Physiological Basis of Crop Improvement

**Credits 3. 3 Lecture Hours.** The underlying physiological basis of past, current and future crop improvement including the associated molecular mechanisms; traits considered include root and shoot architecture, radiation use efficiency, flowering time, floral development and sex, high density planting tolerance, stress tolerance, crop-microbe interactions and yield. **Prerequisites:** SCSC 307 or approval of instructor.

## SCSC 640 Intellectual Property in the Plant Sciences

**Credits 3. 3 Lecture Hours.** Introduction to major foci of intellectual property (IP) impacting plant sciences, including: 1) traditional vs. emerging knowledge economies, 2) governing statutes and treaties, 3) forms of IP, and 4) IP asset identification, valuation, capture and deployment towards understanding the best practices for IP strategy development and IP portfolio management.

## SCSC 641 Plant Breeding I

**Credits 3. 3 Lecture Hours.** Theoretical and practical aspects of plant breeding including genetic basis; application of breeding methods and interdisciplinary considerations in breeding problems. **Prerequisites:** SCSC 304 or HORT 404; GENE 301; STAT 651.

## SCSC 642 Plant Breeding II

**Credits 3. 3 Lecture Hours.** Expectations of genetic improvement for different plant breeding methods; relative efficiency for crops of different reproductive mechanisms; genetic variances, covariances and genotype-environment interaction components of variance used in planning selection procedures. **Prerequisites:** SCSC 641; GENE 613; STAT 619.

## SCSC 643/GENE 643 Molecular Quantitative Genetics and Plant Breeding

**Credits 3. 3 Lecture Hours.** Classical, applied and molecular aspects of quantitative genetics in plant breeding; genetic relationships; genetic diversity; genetic phenomena (linkage, heterosis and epistasis); genotype by environment interaction; mapping quantitative trait loci (QTL); genomic and marker-assisted selection; application of statistical software. **Prerequisites:** STAT 651, SCSC 642 or GENE 613; or approval of instructor. **Cross Listing:** GENE 643/SCSC 643.

## SCSC 644 Forage Ecology and Management

**Credits 3. 3 Lecture Hours.** Investigation of multidisciplinary approaches toward the development of integrated forage, livestock, and wildlife production systems that are economically feasible and environmentally sustainable. **Prerequisites:** Approval of instructor and graduate classification.

## SCSC 646 Advanced Studies in Cotton Fiber Quality and Its Measurements

**Credits 3. 3 Lecture Hours.** Advanced studies in cotton fiber quality and its measurement will explore the morphology of cotton fiber growth, the instruments used to determine fiber quality, and the interpretation of quality measurements.

## SCSC 647 Genome Editing in Crop Plants

**Credits 2. 2 Lecture Hours.** Principles of genome editing technologies; applications of genome editing for crop improvement; review of intellectual property and regulatory issues in crop gene editing. **Prerequisites:** Graduate classification or approval of instructor.

## SCSC 650 Mode of Action and Environmental Fate of Herbicides

**Credits 3. 2 Lecture Hours. 3 Lab Hours.** Relationships between physical-chemical characteristics of herbicides and their biological activity, selectivity, environmental fate in soil, water, and plants. Laboratory includes practical applications of gas and liquid chromatography, liquid scintillation counting and plant bioassays. **Prerequisite:** SCSC 450 or approval of instructor.

## SCSC 651 Weed Biology and Ecology

**Credits 3. 2 Lecture Hours. 2 Lab Hours.** Fundamentals of weed invasion, development, persistence and competition with agronomic crops; consideration of ecological concepts important to weed-crop relationships as influenced by weed control and other cultural practices. Practical consideration of integrated weed management systems and weed identification. **Prerequisites:** SCSC 303; MEPS 313.

## SCSC 653 Essentials for Weed Systematic Identification and Management in Agronomy

**Credits 3. 3 Lecture Hours.** Fundamental understanding and hands-on training on the basics of plant weed identification and management; relevant to agronomy, turf, horticulture and rangeland science and vegetation identification and management.

## SCSC 654 Analysis of Complex Genomes

**Credits 3. 3 Lecture Hours.** History and current status of genetic and molecular analysis of higher eukaryotic genomes; coverage of techniques for dissection of genomes into manageable parts; investigations in genetics, breeding and evolution; emphasis on quantitative inheritance, genetic mapping, physical mapping, map-based cloning, with examples drawn from a wide range of organisms. **Prerequisite:** GENE 603 or GENE 431/BICH 431. **Cross Listing:** GENE 654 and MEPS 654.

## SCSC 655 Analysis of Complex Genomes—Lab

**Credits 3. 0 Lecture Hours. 7 Lab Hours.** Analysis of Complex Genomes—Lab. Laboratory methods in molecular genetic techniques for genetic mapping, physical mapping, and map-based cloning of both qualitative and quantitative phenotypes. **Prerequisite:** GENE 603 or equivalent or approval of instructor. **Cross Listing:** GENE 655 and MEPS 655.

## SCSC 657 Environmental Soil and Water Science

**Credits 3. 3 Lecture Hours.** Discussion of physical, chemical, and biological properties of soil and water and the impact on productivity and sustainability of various ecosystems; application of the knowledge of properties and soil processes to develop and evaluate strategies for protecting and/or improving soil and water quality. **Prerequisite:** SCSC 301.

## SCSC 658 Watershed Water and Soil Quality Management

**Credits 3. 3 Lecture Hours.** Land use impact on surface and ground water chemistry; legislation impacting water quality; surface and groundwater impairment and restoration; case studies in best management practices. **Prerequisite:** Graduate classification.

## SCSC 660 Experimental Designs in Agriculture

**Credits 3. 3 Lecture Hours.** Fundamental principles and procedures of experimental designs in agricultural sciences; emphasis includes factorial designs, predicting outputs, use of covariance, balanced and unbalanced experimental designs as related to common agricultural research projects under field, greenhouse or growth chamber culture; familiarization with computer programming of common statistical software. **Prerequisite:** STAT 651.

## SCSC 671/MEPS 671 Plant Growth and Development

**Credits 3. 3 Lecture Hours.** Comprehensive analysis of plant development primarily focused on the molecular and cellular processes underlying morphogenesis, vegetative growth and reproduction; role of the major phytohormones as coordinators of development will be analyzed; plastic developmental responses to conditioning environmental signals. **Prerequisites:** MEPS 601 or approval of instructor. **Cross Listing:** MEPS 671/SCSC 671.

## SCSC 681 Seminar

**Credit 1. 1 Lecture Hour.** For graduate students and staff members in soils and crops; presentation and discussion of special topics and research data; participation required of all graduate students in agronomy.

## SCSC 684 Professional Internship

**Credits 1 to 16. 1 to 16 Lecture Hours.** Program planned to provide professional training in student's particular field of interest. Faculty and employer will supervise the activity. **Prerequisite:** Approval of instructor.

## SCSC 685 Directed Studies

**Credits 1 to 4. 1 to 4 Lecture Hours.** Advanced problems in some phase of agronomy not directly related to thesis or dissertation.

## SCSC 689 Special Topics in...

**Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours.** Selected topics in an identified area of agronomy. May be repeated for credit. **Prerequisite:** Approval of department head.

## SCSC 691 Research

**Credits 1 to 23. 1 to 23 Other Hours.** Investigations leading to thesis or dissertation.