

Crop, Soil and Environmental Sciences (CSES)

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Crop, Soil and Environmental Sciences Website (<http://cses.uark.edu/>)

Degrees Conferred:
M.S., Ph.D. (CSES)

Areas of Study: Crop sciences, soil sciences, and environmental sciences. Areas of specialization within these concentrations include plant breeding and genetics, biotechnology, water quality, environmental science, crop physiology, crop production, weed science, pesticide residue, seed technology, soil chemistry, soil classification, soil fertility, soil microbiology, and soil physics.

Primary Areas of Faculty Research: Environmental, soil, and water science (bioremediation, soil and water quality, microbial ecology, nutrient management, natural resource management using GIS); plant sciences (plant breeding and genetics, plant biotechnology, plant physiology, weed science), and agronomic production science.

Prerequisites to Degree Programs: While extensive undergraduate training in agriculture and physical and biological science is desirable, no specific prerequisites are required. Deficiencies in undergraduate major or prerequisites for advanced courses may be included in the student's program.

M.S. in Crop, Soil and Environmental Science

Requirements for the Master of Science Degree:

Minimum of 24 semester hours of course work as outlined by the student's graduate advisory committee plus six semester hours of thesis credit. The student will be given an oral examination after the thesis is completed.

Students should also be aware of Graduate School requirements with regard to master's degrees (<http://catalog.uark.edu/graduatecatalog/degree requirements/#mastersdegreestext>).

Ph.D. in Crop, Soil and Environmental Science

Requirements for the Doctor of Philosophy Degree: After a student has been admitted to the Graduate School and accepted by the department as being qualified for advanced work, the student is assigned to a major adviser. The major adviser will, in consultation with the department head, select a graduate committee. This committee will serve both in an advisory capacity for the student's program and as the dissertation and examination committee. The student's graduate advisory committee will determine the number of hours of course work to be completed for the degree.

The student must take candidacy examinations (prelims) in at least five fields of study after completing approximately two years of graduate

study and at least one year before completing all other requirements. Preliminary examinations must be written and oral. Further details regarding requirements for the Doctor of Philosophy degree are available in the department office.

Students should also be aware of Graduate School requirements with regard to doctoral degrees (<http://catalog.uark.edu/graduatecatalog/degree requirements/#phdandeddgreestext>).

Graduate Faculty

B

Bacon, Robert Keith, Ph.D. (Purdue University), M.S., B.S.A., (University of Arkansas), Professor, 1984, 1993.

Barber, Thomas, Ph.D., M.S., B.S. (University of Arkansas), Professor, 2007, 2016.

Bourland, Fred, Ph.D. (Texas A&M University), M.S., B.S.A. (University of Arkansas), Professor, 1988.

Brye, Kristofor R., Ph.D., M.S. (University of Wisconsin-Madison), B.S. (University of Wisconsin-Stevens Point), University Professor, 2001, 2020.

Burgos, Nilda Roma, Ph.D., M.S. (University of Arkansas), B.S. (Visayas State College of Agriculture-Philippines), Professor, 1998, 2010.

Butts, Thomas R., Ph.D. (University of Nebraska-Lincoln), Assistant Professor, 2019.

C

Counce, Paul Allen, Ph.D. (University of Georgia), M.S. (Purdue University), B.S. (University of Tennessee-Martin), Professor, 1983, 2003.

D

Daniels, Michael B., Ph.D., M.S. (University of Arkansas), B.S. (Pennsylvania State University), Professor, 1996, 2006.

E

Espinoza, Leonel A., Ph.D., M.S. (University of Florida), B.S. (Iowa State University), Associate Professor, 2003, 2007.

G

Gbur, Edward E., Ph.D., M.S. (The Ohio State University), B.S. (Saint Francis University), Professor, 1987, 1998.

H

Hardke, Jarrod T., Ph.D. (Louisiana State University), B.S.A. (University of Arkansas), Professor, 2013, 2020.

K

Kelley, Jason, Ph.D., M.S. (Oklahoma State University), B.S. (Kansas State University), Professor, 2003, 2019.

M

Mason, Richard Esten, Ph.D., B.A. (Texas A&M University), Associate Professor, 2010, 2016.

Mauromoustakos, Andy, Ph.D., M.S. (Oklahoma State University), B.S. (Oral Roberts University), Professor, 1989, 2002.

Miller, David M., Ph.D. (University of Georgia), M.S., B.S. (Purdue University), Professor, 1988, 2001.

Mozaffari, Morteza, Ph.D. (University of Delaware), M.S., B.S. (University of Massachusetts), Assistant Professor, 2002.

Mozzoni, Leandro, Ph.D. (University of Arkansas), M.S. B.S. (Rosario National University), Associate Professor, 2017.

N

Norsworthy, Jason Keith, Ph.D., M.S. (University of Arkansas), B.S. (Louisiana Tech University), Distinguished Professor, 2006, 2019.

P

Pereira, Andy, Ph.D. (Iowa State University), M.S. (Indian Agricultural Research Institute, India), B.Sc.Ag. (Govind Ballabh Pant University of Agriculture and Technology, India), Professor, Anheuser-Busch and Arkansas Wholesalers Professorship in Molecular Genetics, 2011.

Poncet, Aurelie, Ph.D. (Auburn University), M.S. (Montpellier SupAgro, France), M.S. Minor: (AgroTIC), B.S. (Montpellier SupAgro, France), Assistant Professor, 2020.

Purcell, Larry C., Ph.D. (University of Florida), M.S., B.S. (University of Georgia), Distinguished Professor, Ben J. Altheimer Chair for Soybean Research, 1993, 2017.

R

Roberts, Trenton L., Ph.D. (University of Arkansas), M.S. (University of Arizona), B.S. (Oklahoma State University), Associate Professor, 2010, 2017.

Robertson, Bill, Ph.D., M.S. (Texas A&M University), B.S. (West Texas State University), Professor, 2014.

Ross, Jeremy, Ph.D, M.S., B.S. (University of Arkansas), Professor, 1996, 2012.

S

Savin, Mary Cathleen, Ph.D., M.S. (University of Rhode Island), B.S. (University of Notre Dame), Professor, 2002, 2011.

Scott, Robert C., Ph.D. (Mississippi State University), M.S., B.S. (Oklahoma State University), Professor, 2002, 2008.

Sha, Xueyan, Ph.D. (Louisiana State University), Professor, 2012.

Shakiba, Ehsan, Ph.D., M.S. (University of Arkansas), M.S., B.S. (Azad University, Iran), Assistant Professor, 2015.

Sharpley, Andrew N., Ph.D. (Massey University, New Zealand), B.S. (University College of North Wales), Distinguished Professor, 2006, 2013.

Skinner, Jerral V., Ph.D. (University of Arkansas), Lecturer, 1990.

Slaton, Nathan A., Ph.D., M.S. (University of Arkansas), B.S. (Murray State University), Professor, 2001, 2009.

Srivastava, Vibha, Ph.D. (Jawaharlal Nehru University, New Delhi), M.S. (Govind Ballabh Pant University of Agriculture and Technology), B.S. (D.E.I. University), Professor, 2001, 2012.

T

Thompson, Gary A., Ph.D. (Purdue University), M.S. (University of Wisconsin), Professor, 2020.

W

Wilson, Charles E., Ph.D., M.S. (University of Arkansas), B.S. (Arkansas State University), Professor, 2011.

Wood, Lisa S., Ph.D., M.S., B.S. (University of Arkansas), Clinical Associate Professor, 2012, 2019.

Courses**CSES 5001. Weed Science Practicum. 1 Hour.**

Training for membership on weed team, through participation. Prerequisite: Graduate standing. (Typically offered: Summer)

CSES 5013. Crop Physiology. 3 Hours.

Understanding and quantitative measurement of physiological processes, plant responses, and environmental parameters in relation to the production of crops. Prerequisite: BIOL 4303. (Typically offered: Spring Even Years)

CSES 5023. Physiology of Herbicide and Plant Interaction. 3 Hours.

The reproduction, growth, and development of weeds and the ecological factors affecting these processes; development and mechanisms of herbicide resistance, flow of herbicide-resistance genes; and development of herbicide-resistant crops. Corequisite: Lab component. Prerequisite: CSES 4143 or CSES 5143 (formerly CSES 4143) and (BIOL 4303 or CHEM 5813). (Typically offered: Spring Odd Years)

CSES 502V. Special Problems Research. 1-6 Hour.

Original investigations on assigned problems in agronomy. Prerequisite: Graduate standing. (Typically offered: Fall, Spring and Summer)

CSES 5033. Advanced Soil Fertility and Plant Nutrition. 3 Hours.

Study of water uptake, ion absorption, translocation and metabolism in higher plants. Lecture 3 hours per week. Prerequisite: BIOL 4303 and CHEM 2613 and CHEM 2611L. (Typically offered: Spring Even Years)

CSES 504V. Special Topics. 1-4 Hour.

Topics not covered in other courses or a more intensive study of specific topics in agronomy. Prerequisite: Graduate standing. (Typically offered: Irregular) May be repeated for degree credit.

CSES 5073. Advanced Crop Science. 3 Hours.

Fundamental concepts of crop physiology, crop improvement, seed science, and crop production systems. Recitation 3 hours per week. Graduate degree credit will not be given for both CSES 4013 and CSES 5073. (Typically offered: Fall)

CSES 5083. The Business of Plant Breeding. 3 Hours.

Students will gain knowledge and develop skills in five areas central to successful execution of plant breeding in private and public environments: 1) breeding industry, 2) breeding goals, new product development and marketing, 3) breeding budgets and finance, 4) regulations of the breeding industry, and 5) leadership basics. (Typically offered: Fall Odd Years)

CSES 5093. Plant Breeding. 3 Hours.

(Formerly CSES 4103.) Basic principles involved in plant breeding programs to improve crop plants and seed programs. Lecture 2 hours, laboratory 2 hours per week. Graduate degree credit will not be given for both CSES 4103 and CSES 5093. Corequisite: Lab component. Prerequisite: ANSC 3123 or BIOL 2323. (Typically offered: Fall Even Years)

CSES 5103. Scientific Presentations. 3 Hours.

Experience in procedures required for professional presentations of scientific papers, seminars, posters; and research findings at meetings in conferences, and with discussion groups. Instruction in organization of materials, visual aids, and good speaking habits. Lecture 3 hours per week. Prerequisite: Graduate standing. (Typically offered: Fall)

CSES 5114. Soil Fertility. 4 Hours.

Study of the soil's chemical, biological and physical properties, and human modification of these properties, as they influence the uptake and utilization of the essential nutrients by plants. Lecture 3 hours, laboratory 2 hours per week. Graduate degree credit will not be given for both CSES 4224 and CSES 5114. Corequisite: Lab component. (Typically offered: Fall)

CSES 5133. Ecology and Morphology of Weedy and Invasive Plants. 3 Hours.

(Formerly CSES 4133.) Study of weeds as economic pests occurring in both agricultural and nonagricultural situations and including poisonous plants and other specific weed problems. Gross morphological plant family characteristics which aid identification, habitat of growth and distribution, ecology, competition, and allelopathy are discussed. Lecture 2 hours, laboratory 2 hours a week. Graduate degree credit will not be given for both CSES 4133 and CSES 5133. Corequisite: Lab component. Prerequisite: CSES 2103 or HORT 2003. (Typically offered: Fall)

CSES 5143. Principles of Weed Control. 3 Hours.

(Formerly CSES 4143.) Advanced concepts and technology used in modern weed control practices and study of the chemistry and specific activity of herbicides in current usage. Lecture 2 hours, laboratory 2 hours per week. Graduate degree credit will not be given for both CSES 4143 and CSES 5143. Corequisite: Lab component. Prerequisite: CHEM 1073 and CHEM 1071L. (Typically offered: Spring)

CSES 5214. Analytical Research Techniques in Agronomy. 4 Hours.

Preparation and analysis of plant and soil samples utilizing spectrophotometry, isotopes, and chromatographic separation methods. Additionally, measurements are made of photosyntheses, respiration, water relationships, light, and temperatures in whole plants. Lecture 2 hours, laboratory 4 hours per week. Corequisite: Lab component. Prerequisite: BIOL 4303 and CHEM 2613 and CHEM 2611L. (Typically offered: Fall Even Years)

CSES 5224. Soil Physics. 4 Hours.

Physical properties of soils and their relation to other soil properties, growth of plants and transport of water, oxygen, heat, and solutes such as pesticides and plant nutrients. Lecture 3 hours, laboratory 3 hours per week. Corequisite: Lab component. Prerequisite: CSES 2203 and MATH 1203. (Typically offered: Spring)

CSES 5233. Plant Genetic Engineering. 3 Hours.

Topics will be covered in the field of in vitro plant biology, transgene genetics and crop genetic engineering. Concepts and applications of transgenic plant technology will be discussed, with the emphasis on the strategies for crop improvement and gene discovery. Lecture 3 hours. (Typically offered: Spring Odd Years)

CSES 5253. Soil Classification and Genesis. 3 Hours.

(Formerly CSES 4253.) Lecture and field evaluation of soil properties and their relation to soil genesis and soil classification with emphasis on soils of Arkansas. Lecture 2 hours, laboratory 2 hours per week. Graduate degree credit will not be given for both CSES 4253 and CSES 5253. Corequisite: Lab component. Prerequisite: CSES 2203 and CSES 2201L. (Typically offered: Fall Odd Years)

CSES 5264. Microbial Ecology. 4 Hours.

A study of the microorganisms in soil and the biochemical processes for which they are responsible. Lecture 3 hours, laboratory 3 hours per week. Additional suggested prerequisites are BIOL 2013, CSES 2203, and ENSC 3003. Corequisite: Lab component. Prerequisite: BIOL 1543 and BIOL 3863 or ENSC 3223. (Typically offered: Fall Odd Years)

CSES 5303. Bioenergy Feedstock Production. 3 Hours.

(Formerly CSES 4303.) Overview of production and characteristics of cultivated crops, perennial grasses, and woody species as feedstocks for bioenergy. Fundamentals of plant growth factors, culture, harvest and storage, quality and improvement, and introduction to environmental impact, modeling, and resource utilization. Graduate degree credit will not be given for both CSES 4303 and CSES 5303. Prerequisite: MATH 1203 and BIOL 1543 or CSES 1203. (Typically offered: Spring)

CSES 5323. Soil/Water Quality in Bioenergy Feedstock Production Systems. 3 Hours.

Examine concepts of soil and water quality in relation to bioenergy feedstock production, explore research related to biomass removal and by-product addition to soils, and examine the potential effects of proposed feedstock production systems on soil and water quality. Prerequisite: MATH 1203 and CSES 2203 or equivalent or consent of instructor, and CSES 4303 or CSES 5303 (formerly CSES 4303) preferred. (Typically offered: Fall Odd Years)

CSES 5453. Soil Chemistry. 3 Hours.

Application of the principles of chemistry to processes of agronomic and environmental importance in soils. Soil clay mineralogy, soil solution thermodynamics, structure and reactivity of humus, surface complexation and ion exchange, electro-chemical phenomena, and colloidal stability. Prerequisite: CSES 2203 and CHEM 1123 and CHEM 1121L. (Typically offered: Fall Even Years)

CSES 5533. Wetland Soils. 3 Hours.

(Formerly CSES 4553.) This course explains the chemical, physical, and morphological characteristics of wetland soils and describes the techniques for identifying wetland soils using field indicators and monitoring equipment. This course also explains principles of wetland creation, restoration, and mitigation - all key components in assuring the sustainability of valuable wetland resources. Graduate degree credit will not be given for both CSES 4553 and CSES 5533. Prerequisite: CSES 2203 and CSES 2201L or CSES 355V. (Typically offered: Spring Odd Years)

CSES 5543. Plant Genomics. 3 Hours.

Plant genetics based on the study of whole genome sequence, transcriptome and proteome. Provides an overview of the principles and techniques of experimental and in silico genomics. Covers all areas of genome research including structural, comparative and functional genomics as well as proteomics. Prerequisite: CHEM 5843 or any graduate level genetics course. (Typically offered: Spring Even Years)

CSES 5553. Forage-Ruminant Relations. 3 Hours.

Advanced chemical, physical, and botanical characteristics of forage plants, the dynamics of grazing, intake and digestion, and techniques of measuring forage utilization and systems analysis at the plant-animal interface. CSES 1203 recommended. Corequisite: Lab component. Prerequisite: ANSC 3143. (Typically offered: Spring Odd Years)

This course is cross-listed with ANSC 5553.

CSES 5653. Fate and Transport of Organic Contaminants. 3 Hours.

Fate and Transport of Organic Contaminants will present an overview of the transformation and transport processes that influence the environmental fate of organic contaminants, with an emphasis on agricultural pesticides. Biotic and abiotic factors influencing the movement and behavior of organic contaminants in soil and water will be covered extensively, with an emphasis on chemical mechanisms. Prerequisite: CHEM 1123 and CHEM 1121L and CSES 2203, or instructor consent. (Typically offered: Spring Odd Years)

CSES 600V. Master's Thesis. 1-6 Hour.

Master's Thesis. Prerequisite: Graduate standing. (Typically offered: Fall, Spring and Summer) May be repeated for degree credit.

CSES 700V. Doctoral Dissertation. 1-18 Hour.

Doctoral Dissertation. Prerequisite: Graduate standing. (Typically offered: Fall, Spring and Summer) May be repeated for degree credit.