

SOIL SCIENCE, PHD

The UW–Madison Department of Soil and Environmental Sciences is one of the oldest, largest, and most prominent soil science departments in the United States. We are home to degrees in soil and environmental sciences. The department's mission is to provide instruction, research, and extension leadership in soil chemistry, physics, biology, and pedology for economic and sustainable land use. Programs are designed to improve basic understanding and practical management of soil and water resources in natural, agricultural, and urban ecosystems, and to serve local, state, national, and global interests. The department extends the Wisconsin Idea to our community and seeks to provide all generations with an appreciation of the science and nature of soil and the environment.

Soil science engages with major global challenges, such as adaptation to and mitigation of climate change, scarcity of water resources, and increasing sustainable and healthy food production to feed a growing global population. Our department's course offerings and research programs span topics ranging from the importance of soils in crop production, environmental issues, turf and grounds management, soil conservation, global climate change, carbon sequestration, microbial ecology, biodiversity, rural and urban planning, and waste resource management. Graduate study in soil science provides the basic and applied scientific training needed for teaching, research, extension, and other professional work in the agricultural, earth, and environmental sciences. The link between soils and biodiversity as well as the effects of soils on biofuel production is widely researched in the Department of Soil and Environmental Sciences.

Graduates from the department occupy impactful positions in industry, government, education, and research in agriculture, natural resources, and environmental science throughout the world. Of the more than 1,000 alumni of the department's graduate program, many are deans, directors, chairs, faculty, and staff at universities in the US and other countries, or in leading positions in government, regulatory agencies, research institutions, agribusinesses, chemical industries, and recreational and conservation organizations.

The number of graduate students enrolled in the program over the past 10 years has averaged 20 per year, with about half pursuing master's degrees and half pursuing doctorates. International students generally comprise about 30% of the total. Department faculty also direct additional graduate students in multidisciplinary research in soils-related programs.

FACULTY RESEARCH

Research in the department focuses on an improved understanding of the soil, the environment, and their interactions with society. The faculty have extensive and long-term experience and knowledge about the soils of Wisconsin, their genesis, properties, and management. The department has an exciting suite of research activities ranging from the molecular level to the global. Research focuses on topical themes like climate change, soil health, biodiversity, and sustainable agriculture.

Many field research projects on soil and water problems are conducted in cooperation with state and federal agencies, agribusinesses, municipalities, and private farmers. The department cooperates closely with the Wisconsin Geological and Natural History Survey, Molecular and Environmental Toxicology Center, and the USDA Natural Resource Conservation Service. Relationships between soils and forests are studied at tree nurseries and in state, private, and commercial forests throughout

the state in cooperation with the Wisconsin Department of Natural Resources and the pulp and paper industry.

Through a long commitment of our staff to international agriculture, the department has assisted in the creation of agricultural colleges in several developing countries, has attracted outstanding international graduate students, and is involved in research collaborations across the globe.

Many department faculty have been recognized nationally and globally for their contributions to soil science. Three soil scientists appointed to the National Academy of Sciences are from the UW–Madison Department of Soil and Environmental Sciences. Several faculty members have received local and national academic, professional-society, trade-association, and industrial prizes and awards for teaching, research, and extension education and serve on important state, national, and international committees. Many faculty members have been recognized for their contributions by election to honorary fellowship in the Soil Science Society of America, the American Society of Agronomy, and allied professional societies.

Our faculty are heavily involved in cooperative interdisciplinary research undertakings with scientists and organizations within and beyond the university, such as UW–Madison's Nelson Institute for Environmental Studies, Environmental Chemistry and Technology Program, Center for Ecology and the Environment, and other science departments, state agencies, environmental consulting and service companies, agribusinesses, and trade organizations.

RESEARCH FACILITIES

Research in the department is conducted in the field, in the laboratory, and in silico. The department is equipped with excellent laboratory, computing, and field equipment and facilities for graduate training and research. Excellent data collection, data logging, computing, and networking facilities are available for basic research and graduate training. In addition to computing facilities maintained by individual researchers for their students and free access to the campus' Center for High-Throughput Computing.

Specialized facilities are available for research in molecular biology, modern environmental microbiology, in vitro toxicology and bioassays, and contaminated-site remediation. Soils graduate students and faculty have shared access to major advanced physicochemical, x-ray, and electron microscopy analytical equipment through the Materials Science Center, National Magnetic Resonance Facility at Madison, National Synchrotron Light Source at Brookhaven National Laboratories, and other UW–Madison science and engineering departments. Facilities, vehicles, machinery, and instrumentation are available for conducting field experiments at ten strategically located UW Agricultural Research Stations and the OJ Noer Turfgrass Research and Education Facility. Fieldwork for agricultural production and environmental protection is supported by daily information from the CALS agricultural weather station network as well as soils, crops, land-use, and natural resources analysis using land information systems and geographic information systems.