SOIL SCIENCE, M.S.

The UW–Madison Department of Soil Science is one of the oldest, largest, and most prominent soil science departments in the United States. It is globally renowned for its excellence in soil research and education. The department’s mission is to provide instruction, research, and extension leadership in soil chemistry, physics, biology, and pedology to economic and sustainable land use. Programs are designed to improve basic understanding and practical management of soil resources in natural, agricultural, and urban ecosystems, and to serve local, state, national, and global interests. The department implements the Wisconsin Idea to the extended community and provides all generations with an appreciation of soil as a key natural resource and thorough understanding of the scientific basis of the environment and agriculture.

Soil science entails understanding soils and applying the principles of physics, chemistry, mathematics, and biology to the sustainable management of soil and the environment. Soil science deals with the effects of climate change and its interaction with the soil, with scarcity of water resources, and the increase of food production to feed 9 billion people. The link between soils and biodiversity as well as the effects of soils on biofuel production is widely researched in the Department of Soil Science.

The department is committed to integrated programs of instruction, research, extension, and outreach that address societal goals of responsible stewardship of soil and water resources.

The importance of soils in crop production, environmental issues, turf and grounds management, soil conservation, global climate change, carbon sequestration, rural and urban planning, and waste disposal are integrated into the department’s course offerings and research programs. Graduate study in soil science provides the basic and applied scientific training needed for teaching, research, and other professional work in the agricultural, earth, and environmental sciences. The department office provides information concerning career placement and available vacancies.

Graduates from the department occupy leading 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 U.S. 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, as well as on interactions between soil and the people of Wisconsin. 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 and soil changes to land use effects of biofuel production to DNA fingerprinting of soil life.

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 in conducting soil surveys and addressing problems of groundwater shortages and contamination. 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 and has attracted outstanding international graduate students. Current research involvement includes Brazil, Chile, China, Trinidad-Tobago, Spain, Australia, Argentina, and Antarctica.

Many department faculty have been recognized nationally and globally for their contributions to soil science. Three of only four soil scientists appointed to the National Academy of Sciences are from the UW–Madison Department of Soil Science. 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 Gaylord Nelson Institute for Environmental Studies, Molecular and Environmental Toxicology Center, Environmental Chemistry and Technology Program, and other science departments, state agencies, environmental consulting and service companies, agribusinesses, and trade organizations.

FUNDING

Financial support is usually available to qualified students in the form of research assistantships, mostly funded from research grants; final decision for granting a research assistantship rests with the professor(s) supervising the research. Any assistantship for at least one-third time qualifies a student for remission of tuition (though students may be responsible for other administrative fees). The department does not offer teaching assistantships. A number of Graduate School fellowships are available to new students with outstanding records. The deadline for application for these competitive fellowships is early January of each year. The department selects the most qualified applicants and forwards their dossiers to a campus-wide selection committee. Support for graduate assistantships is available through two Wisconsin Distinguished Fellowships (the W.R. Kussow/Wisconsin Turfgrass Association and the Leo M. Walsh/Wisconsin Fertilizer and Chemical Association), the C.B. Tanner Agricultural Physics Award Fund, and the Charles and Alice Ream Soil and Water Protection Research Fund. In addition, there are two awards given annually to outstanding incoming
graduate students, the O.N. Allen Graduate Fellowship for Agriculture and the Kelling Soil Fertility Award.

**REQUIREMENTS**

**MINIMUM DEGREE REQUIREMENTS AND SATISFACTORY PROGRESS**

To make progress toward a graduate degree, students must meet the Graduate School Minimum Degree Requirements and Satisfactory Progress (http://guide.wisc.edu/graduate/#policiesandrequirementstext) in addition to the requirements of the program.

**MASTER’S DEGREES**

M.S.

**MINIMUM GRADUATE DEGREE CREDIT REQUIREMENT**

30 credits

**MINIMUM GRADUATE RESIDENCE CREDIT REQUIREMENT**

16 credits

**MINIMUM GRADUATE COURSEWORK (50%) REQUIREMENT**

Candidates for the M.S. degree must earn a minimum of 15 credits of graduate coursework; courses with the Graduate Level Coursework attribute are identified and searchable in the university’s Course Guide (http://my.wisc.edu/CourseGuideRedirect/BrowseByTitle).

**PRIOR COURSEWORK REQUIREMENTS: GRADUATE WORK FROM OTHER INSTITUTIONS**

With program approval, students are allowed to count no more than 12 credits of graduate coursework taken during graduate study at other institutions. coursework earned five or more years prior to admission to a master’s degree is not allowed to satisfy requirements.

**PRIOR COURSEWORK REQUIREMENTS: UW–MADISON UNDERGRADUATE**

With program approval, students are allowed to count no more than 7 credits of graduate coursework numbered 300 or above from a UW–Madison undergraduate degree. The coursework may also count toward the 50% graduate coursework requirement if the courses are numbered 700 or above. Coursework earned five or more years prior to admission to a master’s degree is not allowed to satisfy requirements.

**PRIOR COURSEWORK REQUIREMENTS: UW–MADISON UNIVERSITY SPECIAL**

With program approval, students are allowed to count no more than 15 credits of coursework numbered 300 or above taken as a UW–Madison University Special student. The coursework may also count toward the 50% graduate coursework requirement if the courses are numbered 700 or above. coursework earned five or more years prior to admission to a master’s degree is not allowed to satisfy requirements.

**CREDITS PER TERM ALLOWED**

15 credits

**PROGRAM-SPECIFIC COURSES REQUIRED**

Courses in basic sciences: Candidates for an M.S. in soil science are required to have completed the basic science courses outlined in the departmental M.S. requirements document.

Courses in soil science: M.S. candidates must meet the minimum departmental course requirements for soils graduate degrees outlined in the departmental M.S. requirements document. M.S. candidates must enroll in a minimum of 1 credit of research (SOIL SCI 990 Research) every semester.

Seminar: All M.S. candidates must present at least one soil science graduate seminar (SOIL SCI 728 Graduate Seminar) for letter grade (>B) during their M.S. program. Each candidate must enroll in a soil science seminar every fall and spring semester; exceptions require the approval of the department chair.

**OVERALL GRADUATE GPA REQUIREMENT**

3.00 GPA required.

**OTHER GRADE REQUIREMENTS**

Required courses in soil science must be completed with a grade of B or better (BC and C may not be offset by AB and A). For all other courses, the requirement is an average record of B or better in all work taken as a graduate student.

**PROBATION POLICY**

The Graduate School regularly reviews the record of any student who earned grades of BC, C, D, F, or Incomplete in a graduate course (300 or above), or grade of U in research credits. This review could result in academic probation with a hold on future enrollment or in being suspended from the Graduate School.

**ADVISOR / COMMITTEE**

The master’s examination committee consists of at least three faculty members of defensible breadth, a minimum of two drawn from the soil science faculty. Defensible breadth shall be subject to certification committee approval. The third member of the committee must have a degree equivalent to that pursued by the student and be approved by the certification committee.

A proposed program for a M.S. candidate satisfying the minimum course requirements must be approved by the certification committee by the end of the first semester of M.S. graduate work. It is the responsibility of the student and the major professor to complete the departmental M.S. certification forms, arrange to be certified by the certification committee, and arrange for approval of revisions in the initial program if this becomes necessary.

**ASSESSMENTS AND EXAMINATIONS**

Students are expected to present a written research plan to their committee no later than the end of the third semester of M.S. graduate work.

Candidates must present an open seminar on their M.S. thesis research, and pass a comprehensive examination (either oral, or an oral–written combination if requested by the candidate) on the graduate work offered in support of their candidacy.

Deposit of the master’s thesis is required.
TIME CONSTRAINTS
Students enrolled full time are expected to complete their degree requirements within two to three years.

LANGUAGE REQUIREMENTS
No language requirements.

ADMISSIONS
A foundation in the basic sciences is essential for graduate study in soil science. The program requires all students to have successfully completed one semester of calculus for the M.S. degree and two semesters of calculus (differential and integral) for the Ph.D., one course in statistics, nine credits of chemistry, and one year of physics. Admission with deficiencies is possible but is likely to delay completion of graduate studies.

The following materials must be submitted when applying to the program: an online application, official transcripts, Graduate Record Exam (GRE) scores, and three references. TOEFL scores are required for applicants whose native language is not English. Because graduate requirements presuppose extensive science coursework, continuing undergraduate students are encouraged to select undergraduate courses carefully if they are considering advanced degrees in soil science.

LEARNING OUTCOMES

KNOWLEDGE AND SKILLS
• Articulates, critiques, and elaborates theories, research methods, and approaches in soil science.
• Identifies sources and assembles evidence addressing questions or challenges in soil science.
• Understands the field of soil science in historical, social, and global contexts.
• Selects and/or utilizes the appropriate methodologies and practices for soil science research.
• Evaluates or synthesizes information addressing research questions.
• Communicates clearly in oral and written forms.

PROFESSIONAL CONDUCT
• Recognizes and applies principles of ethical and professional conduct.

PEOPLE
Faculty: Professors Hartemink (chair), Barak, Bland, Bleam, Hickey, Kung, Laboski, Long, Pedersen, Powell, Ventura; Associate Professors Balster, Ruark, Soldat; Assistant Professors Arriaga, Whitman