SOIL SCIENCE, MS

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.

ADMISSIONS

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Please consult the table below for key information about this degree program's admissions requirements. The program may have more detailed

admissions requirements, which can be found below the table or on the program's website.

Graduate admissions is a two-step process between academic programs and the Graduate School. ***Applicants must meet* the minimum requirements (https://grad.wisc.edu/apply/requirements/) *of the Graduate School as well as the program(s).*** Once you have researched the graduate program(s) you are interested in, apply online (https://grad.wisc.edu/apply/).

Requirements	Detail
Fall Deadline	January 5
Spring Deadline	October 15
Summer Deadline	January 5
GRE (Graduate Record Examinations)	Not required.
English Proficiency Test	Every applicant whose native language is not English, or whose undergraduate instruction was not exclusively in English, must provide an English proficiency test score earned within two years of the anticipated term of enrollment. Refer to the Graduate School: Minimum Requirements for Admission policy: https://policy.wisc.edu/library/UW-1241 (https://policy.wisc.edu/library/UW-1241/).
Other Test(s) (e.g., GMAT, MCAT)	n/a
Letters of Recommendation Required	3

SUGGESTED PREPARATORY COURSEWORK

A foundation in the basic sciences is essential for graduate study in soil science. Continuing undergraduate students are encouraged to select undergraduate courses carefully if they are considering advanced degrees in soil science. The program recommends applicants complete the suggested preparatory coursework (or equivalent) listed below. Admission without this suggested preparation is possible but may delay the completion of graduate studies. If this preparatory coursework has not been completed prior to admission, a student's examination committee and/or advisor may require this coursework be completed during the MS program depending on the student's academic, research, and career goal needs.

Code	Title	Credits
MATH 221	Calculus and Analytic Geometry 1	4-5
or MATH 222	Calculus and Analytic Geometry 2	
STAT 301	Introduction to Statistical Methods	3
CHEM 109 & CHEM 327	Advanced General Chemistry and Fundamentals of Analytical Science	9
or CHEM 103/104	General Chemistry I	
PHYSICS 103	General Physics	4
BIOLOGY/BOTANY/ ZOOLOGY 151	Introductory Biology	3
or BOTANY/ BIOLOGY/ ZOOLOGY 152	Introductory Biology	
or BIOCHEM 501	Introduction to Biochemistry	
or BIOCHEM 507	General Biochemistry I	

FUNDING

FUNDING

GRADUATE SCHOOL RESOURCES

The Bursar's Office provides information about tuition and fees associated with being a graduate student. Resources to help you afford graduate study might include assistantships, fellowships, traineeships, and financial aid. Further funding information is available from the Graduate School. Be sure to check with your program for individual policies and restrictions related to funding.

PROGRAM RESOURCES

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 offers a limited number of 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 departmental graduate assistantships is available through three Wisconsin Distinguished Fellowships (the W.R. Kussow/Wisconsin Turfgrass Association, R.C. Newman/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 numerous scholarships and awards offered annually.

REQUIREMENTS

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MINIMUM GRADUATE SCHOOL REQUIREMENTS

Review the Graduate School minimum academic progress and degree requirements (https://guide.wisc.edu/graduate/#policiesandrequirementstext), in addition to the program requirements listed below.

MAJOR REQUIREMENTS

MODE OF INSTRUCTION

Face to Face	Evening/ Weekend	Online	Hybrid	Accelerated
Yes	No	No	No	No

Mode of Instruction Definitions

Accelerated: Accelerated programs are offered at a fast pace that condenses the time to completion. Students typically take enough credits aimed at completing the program in a year or two.

Evening/Weekend: Courses meet on the UW–Madison campus only in evenings and/or on weekends to accommodate typical business

schedules. Students have the advantages of face-to-face courses with the flexibility to keep work and other life commitments.

Face-to-Face: Courses typically meet during weekdays on the UW-Madison Campus.

Hybrid: These programs combine face-to-face and online learning formats. Contact the program for more specific information.

Online: These programs are offered 100% online. Some programs may require an on-campus orientation or residency experience, but the courses will be facilitated in an online format.

CURRICULAR REQUIREMENTS

Requirement	Detail
Minimum Credit Requirement	30 credits
Minimum Residence Credit Requirement	16 credits
Minimum Graduate Coursework Requirement	15 credits must be graduate-level coursework. Refer to the Graduate School: Minimum Graduate Coursework (50%) Requirement policy: https://policy.wisc.edu/library/UW-1244 (https://policy.wisc.edu/library/UW-1244/).
Overall Graduate GPA Requirement	3.00 GPA required. Refer to the Graduate School: Grade Point Average (GPA) Requirement policy: https://policy.wisc.edu/library/UW-1203 (https://policy.wisc.edu/library/UW-1203/).
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.
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 MS graduate work. Candidates must present an open seminar on their MS 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.
Language Requirements	No language requirements.

REQUIRED COURSES

Code	Title	Credits
SOIL SCI 301	General Soil Science	3
SOIL SCI 302	Meet Your Soil: Soil Analysis and Interpretation Laboratory	1
At least one course from 4 of the following 5 areas:		15
Soil Physics		
SOIL SCI/ ATM OCN/ PLANTSCI 532	Environmental Biophysics	
or SOIL SCI 622	Soil Physics	
Soil Chemistry [1]		
SOIL SCI 321		
or SOIL SCI/ F&W ECOL 451	Environmental Biogeochemistry	
or SOIL SCI 621	Soil and Environmental Chemistry	
or SOIL SCI/ BOTANY/ HORT 626	Mineral Nutrition of Plants	
Soil Biology [1]		
SOIL SCI 323	Soil Biology	
or SOIL SCI/ F&W ECOL 451	Environmental Biogeochemistry	
or SOIL SCI/ MICROBIO 523	Soil Microbiology and Biochemistry	
Soil Fertility		
SOIL SCI 326	Plant Nutrition Management	
Environmental Soil Science		
SOIL SCI/ ENVIR ST 324	Soils and Environmental Quality	
or SOIL SCI 327	Environmental Monitoring and Soil Characterization	
Other Required Coursework		
SOIL SCI 728	Graduate Seminar [2]	1
SOIL SCI 990	Research [3]	4
MS candidates must enroll in a minimum of 6 credits of non-research courses approved by the student's examination committee and/or advisor.		6
Total credits		**30**

1. Students who take SOIL SCI/F&W ECOL 451 Environmental Biogeochemistry may use the credits toward the Soil Chemistry requirement or the Soil Biology requirement, but it cannot count towards both categories.
2. All MS candidates give a presentation in SOIL SCI 728 at least once during their MS program.
3. MS candidates must enroll in a minimum of 1 credit of SOIL SCI 990 every semester.

POLICIES

GRADUATE SCHOOL POLICIES

The Graduate School's Academic Policies and Procedures (https://grad.wisc.edu/acadpolicy/) provide essential information regarding general university policies. Program authority to set degree policies beyond the minimum required by the Graduate School lies with the degree program faculty. Policies set by the academic degree program can be found below.

MAJOR-SPECIFIC POLICIES

PRIOR COURSEWORK

Graduate Credits Earned at Other Institutions

With program approval, students are allowed to count up to 12 credits of graduate coursework taken during graduate study at other institutions. Coursework earned ten or more years prior to admission to a master's degree is not allowed to satisfy requirements. Students may petition the department for an appeal of the ten year limit on a case-by-case basis.

Undergraduate Credits Earned at Other Institutions or UW-Madison

With program approval, students are allowed to count up to 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 ten or more years prior to admission to a master's degree is not allowed to satisfy requirements. Students may petition the department for an appeal of the time limit on a case-by-case basis.

Credits Earned as a Professional Student at UW-Madison (Law, Medicine, Pharmacy, and Veterinary careers)

Refer to the Graduate School: Transfer Credits for Prior Coursework (https://policy.wisc.edu/library/UW-1216/) policy.

Credits Earned as a University Special student at UW-Madison

With program approval, students are allowed to count up to 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 ten or more years prior to admission to a master's degree is not allowed to satisfy requirements. Students may petition the department for an appeal of the ten year limit on a case-by-case basis.

PROBATION

Refer to the Graduate School: Probation (https://policy.wisc.edu/library/UW-1217/) policy.

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

CREDITS PER TERM ALLOWED

15 credits

TIME LIMITS

Students enrolled full time are expected to complete their degree requirements within two to three years.

Refer to the Graduate School: Time Limits (https://policy.wisc.edu/library/UW-1221/) policy.

GRIEVANCES AND APPEALS

These resources may be helpful in addressing your concerns:

- Bias or Hate Reporting (https://doso.students.wisc.edu/bias-or-hate-reporting/)
- Graduate Assistantship Policies and Procedures (https://hr.wisc.edu/policies/gapp/#grievance-procedure)
- Hostile and Intimidating Behavior Policies and Procedures (https://hr.wisc.edu/hib/)
  - Office of the Provost for Faculty and Staff Affairs (https://facstaff.provost.wisc.edu/)
- Employee Assistance (http://www.eao.wisc.edu/) (for personal counseling and workplace consultation around communication and conflict involving graduate assistants and other employees, post-doctoral students, faculty and staff)
- Employee Disability Resource Office (https://employeedisabilities.wisc.edu/) (for qualified employees or applicants with disabilities to have equal employment opportunities)
- Graduate School (https://grad.wisc.edu/) (for informal advice at any level of review and for official appeals of program/departmental or school/college grievance decisions)
- Office of Compliance (https://compliance.wisc.edu/) (for class harassment and discrimination, including sexual harassment and sexual violence)
- Office Student Assistance and Support (OSAS) (https://osas.wisc.edu/) (for all students to seek grievance assistance and support)
- Office of Student Conduct and Community Standards (https://conduct.students.wisc.edu/) (for conflicts involving students)
- Ombuds Office for Faculty and Staff (http://www.ombuds.wisc.edu/) (for employed graduate students and post-docs, as well as faculty and staff)
- Title IX (https://compliance.wisc.edu/titleix/) (for concerns about discrimination)

College of Agricultural and Life Sciences: Grievance Policy

In the College of Agricultural and Life Sciences (CALS), any student who feels unfairly treated by a member of the CALS faculty or staff has the right to complain about the treatment and to receive a prompt hearing. Some complaints may arise from misunderstandings or communication breakdowns and be easily resolved; others may require formal action. Complaints may concern any matter of perceived unfairness.

To ensure a prompt and fair hearing of any complaint, and to protect the rights of both the person complaining and the person at whom the complaint is directed, the following procedures are used in the College of Agricultural and Life Sciences. Any student, undergraduate or graduate, may use these procedures, except employees whose complaints are covered under other campus policies.

1. The student should first talk with the person at whom the complaint is directed. Most issues can be settled at this level. Others may be resolved by established departmental procedures.
2. If the student is unsatisfied, and the complaint involves any unit outside CALS, the student should seek the advice of the dean or director of that unit to determine how to proceed.
   a. If the complaint involves an academic department in CALS the student should proceed in accordance with item 3 below.
   b. If the grievance involves a unit in CALS that is not an academic department, the student should proceed in accordance with item 4 below.
3. The student should contact the department's grievance advisor within 120 calendar days of the alleged unfair treatment. The departmental administrator can provide this person's name. The grievance advisor will attempt to resolve the problem informally within 10 working days of receiving the complaint, in discussions with the student and the person at whom the complaint is directed.
   a. If informal mediation fails, the student can submit the grievance in writing to the grievance advisor within 10 working days of the date the student is informed of the failure of the mediation attempt by the grievance advisor. The grievance advisor will provide a copy to the person at whom the grievance is directed.
   b. The grievance advisor will refer the complaint to a department committee that will obtain a written response from the person at whom the complaint is directed, providing a copy to the student. Either party may request a hearing before the committee. The grievance advisor will provide both parties a written decision within 20 working days from the date of receipt of the written complaint.
   c. If the grievance involves the department chairperson, the grievance advisor or a member of the grievance committee, these persons may not participate in the review.
   d. If not satisfied with departmental action, either party has 10 working days from the date of notification of the departmental committee action to file a written appeal to the CALS Equity and Diversity Committee. A subcommittee of this committee will make a preliminary judgement as to whether the case merits further investigation and review. If the subcommittee unanimously determines that the case does not merit further investigation and review, its decision is final. If one or more members of the subcommittee determine that the case does merit further investigation and review, the subcommittee will investigate and seek to resolve the dispute through mediation. If this mediation attempt fails, the subcommittee will bring the case to the full committee. The committee may seek additional information from the parties or hold a hearing. The committee will present a written recommendation to the dean who will provide a final decision within 20 working days of receipt of the committee recommendation.
4. If the alleged unfair treatment occurs in a CALS unit that is not an academic department, the student should, within 120 calendar days of the alleged incident, take his/her grievance directly to the Associate Dean of Academic Affairs. The dean will attempt to resolve the problem informally within 10 working days of receiving the complaint. If this mediation attempt does not succeed the student may file a written complaint with the dean who will refer it to the CALS Equity and Diversity Committee. The committee will seek a written response from the person at whom the complaint is directed, subsequently following other steps delineated in item 3d above.

OTHER

Financial support is available to qualified MS and PhD students in the form of research assistantships. Most assistantships are funded through research grants, and the final decision rests with the professor(s) supervising the research. A research assistantship for at least one-third time qualifies a student for remission of all tuition. The department offers a limited number of teaching assistantships. Graduate School fellowships are also available.

PROFESSIONAL DEVELOPMENT

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GRADUATE SCHOOL RESOURCES

Take advantage of the Graduate School's professional development resources (https://grad.wisc.edu/pd/) to build skills, thrive academically, and launch your career.

PROGRAM RESOURCES

UW–Madison offers a wealth of resources intended to enrich your graduate studies and enhance your professional skills. Starting your very first year on campus, it is expected that you will take full advantage of the career and professional development resources that best fit your needs and support your goals. Since our alumni thrive not only in academia but also in industry, corporate, government, and non-profit arenas, we strive to be in tune, holistic, and innovative in our approach to meeting the diverse professional development needs of our students. By actively participating in these professional development opportunities, you will build the skills needed to succeed academically at UW–Madison and to thrive professionally in your chosen career.

LEARNING OUTCOMES

LEARNING OUTCOMES

1. Articulates, critiques, and elaborates theories, research methods, and approaches in soil science.
2. Identifies sources and assembles evidence addressing questions or challenges in soil science.
3. Understands the field of soil science in historical, social, and global contexts.
4. Selects and/or utilizes the appropriate methodologies and practices for soil science research.
5. Evaluates or synthesizes information addressing research questions.
6. Communicates clearly in oral and written forms.
7. Recognizes and applies principles of ethical and professional conduct.