# ENVIRONMENTAL SOIL SCIENCE, CERTIFICATE

The Environmental Soil Science Certificate is a gateway to understanding the dynamics of Earth's thin living skin. Soil is where the atmosphere, lithosphere, and hydrosphere connect and is pivotal in shaping ecosystems' biodiversity, health, and resilience. Mastery of soil properties, processes, and distribution is necessary for addressing pressing environmental challenges, including food and energy security, water quality protection, climate change, and ecosystem health.

This certificate equips students with a holistic understanding of soil and its intersection with environmental issues. Rooted in a foundational soil science course, students delve into thematic areas, forming connections between soils and various environmental domains.

Designed as a launchpad, this certificate empowers students to pursue careers and certification in the field of soil science, opening doors for employment in the public and private sectors. Our dedicated advisors will guide students in selecting courses tailored to prepare them for their journey toward expertise in soil science and environmental stewardship.

# HOW TO GET IN

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The Certificate in Environmental Soil Science is open to all undergraduate students. Students pursuing the program are encouraged to declare as early as possible so that they can best align the coursework with their interests and plan their field experience.

#### PREPARATORY COURSEWORK

No courses are required to declare the certificate; however, general chemistry is a prerequisite to complete required courses in the certificate.

Code	Title	Credits
CHEM 103	General Chemistry I	4
CHEM 109	Advanced General Chemistry	5
CHEM 115	Chemical Principles I	5

### REQUIREMENTS

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Code	Title	Credits
Soil Science F	oundation	2
Soil Science T	hemes	ç
Allied Science	S	2-4
<b>Total Credits</b>		16

- The certificate requires a minimum of 16 credits.
- A minimum grade of C is required in all certificate coursework.
- Courses taken on a pass/fail (satisfactory/unsatisfactory) basis will not count toward the certificate.
- All certificate coursework must be completed in residence at the UW-Madison.

#### SOIL SCIENCE FOUNDATION

Complete the following courses for a total of **4 credits**:

Code	Title	Credits
SOIL SCI 301	General Soil Science	3
or SOIL SCI/ ENVIR ST/ GEOG 230	Soil: Ecosystem and Resource	
SOIL SCI 302	Meet Your Soil: Soil Analysis and Interpretation Laboratory	1
Total Credits		4

#### SOIL SCIENCE THEMES

Complete at least one course from three of the four thematic areas for a minimum of **9 credits**. Courses may only count towards one thematic area. Additional courses from this section may be completed to meet the overall minimum credits for the certificate.

#### Soil Fertility & Chemistry

Code	Title	Credits
SOIL SCI 326	Plant Nutrition Management	3
SOIL SCI/BSE/ CIV ENGR 372	On-Site Waste Water Treatment and Dispersal	2
SOIL SCI 430	Soil Pollution and Human Health	3
SOIL SCI/ F&W ECOL 451	Environmental Biogeochemistry	3
SOIL SCI 621	Soil and Environmental Chemistry	3
SOIL SCI/ CIV ENGR/ M&ENVTOX 631	Toxicants in the Environment: Sources, Distribution, Fate, & Effects	3

#### Soil Physics & Development

Code	Title	Credits
PLANTSCI/ ATM OCN 532	Environmental Biophysics	3
SOIL SCI 327	Environmental Monitoring and Soil Characterization	3
SOIL SCI/ GEOG 525	Soil Geomorphology	3
SOIL SCI/ GEOG 526	Human Transformations of Earth Surface Processes	3
SOIL SCI 622	Soil Physics	3

#### Soil Biology & Ecology

Code	Title	Credits
SOIL SCI 323	Soil Biology	3
SOIL SCI/ MICROBIO 425	Environmental Microbiology	3
AGROECOL 370	Grassland Ecology	3
SOIL SCI/ F&W ECOL 451	Environmental Biogeochemistry	3
SOIL SCI/ MICROBIO 523	Soil Microbiology and Biochemistry	3

#### Soils and the Environment

Code	Title	Credits
SOIL SCI 211	Soils and Climate Change	2
SOIL SCI 250	Introduction to Environmental Science	3
SOIL SCI/ ENVIR ST 324	Soils and Environmental Quality	3
SOIL SCI 327	Environmental Monitoring and Soil Characterization	3
SOIL SCI 430	Soil Pollution and Human Health	3
SOIL SCI 499	Soil Management	3
SOIL SCI/ ENVIR ST 575	Assessment of Environmental Impact	3
SOIL SCI 585	Using R for Soil and Environmental Sciences	3

#### ALLIED SCIENCES

Complete one course from the following for a minimum of **2 credits**:

#### **Course List**

Code	Title	Credits
A A E 101	Introduction to Agricultural and Applied Economics	4
A A E/ENVIR ST 244	The Environment and the Global Economy	4
A A E 352	Global Health: Economics, Natural Systems, and Policy	4
AGROECOL/ C&E SOC/ENTOM/ ENVIR ST 103	Agroecology: An Introduction to the Ecology of Food and Agriculture	3
AGROECOL 370	Grassland Ecology	3
BSE 301	Land Information Management	3
AGROECOL 377	Global Food Production and Health	3
BSE/CIV ENGR/ SOIL SCI 372	On-Site Waste Water Treatment and Dispersal	2
BSE 473	Water Management Systems	3
C&ESOC/SOC 140	Introduction to Community and Environmental Sociology	4
C&E SOC/SOC 222	Food, Culture, and Society	3
C&E SOC/ F&W ECOL/ SOC 248	Environment, Natural Resources, and Society	3
C&E SOC/A A E/ SOC 340	Issues in Food Systems	3-4
ENTOM/ NUTR SCI 203	Introduction to Global Health	3
ENTOM 570	Systems Thinking in Global Health	3
PLANTSCI 110	Introduction to Plant Science and Technology	4
PLANTSCI 227	Propagation of Horticultural Plants	3
LSC 212	Introduction to Scientific Communication	3
PLANTSCI/ PL PATH 261	Sustainable Turfgrass Use and Management	2
PLANTSCI 370	World Vegetable Crops	3
LSC 251	Science, Media and Society	3

LSC 430	Communicating Science with Narrative	3
PL PATH 311	Global Food Security	3

## CERTIFICATE COMPLETION REQUIREMENT

This undergraduate certificate must be completed concurrently with the student's undergraduate degree. Students cannot delay degree completion to complete the certificate.

#### LEARNING OUTCOMES

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- 1. Discuss, debate, and communicate those aspects of soil science pertinent to their primary major, specialization, and career goals.
- Describe how soil integrates into larger environmental issues using its properties, processes, and distribution from local to global scales and natural to anthropogenic environments.
- 3. Identify potential solutions to issues related to soil that promote the ecosystem services soil provides.
- 4. Communicate, in written or oral form, potential environmental impacts of land-use practices involving soil.

### ADVISING AND CAREERS

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Each certificate student is assigned an advisor who works to understand student goals and help students shape their path through the certificate. Advisors also provide support for post-graduation plans such as jobs, fellowships, or graduate school.

There may be additional requirements for students seeking a Professional Soil Scientist certification beyond the Certificate requirements. The certificate advisor can help you identify courses that will meet requirements for the Professional Soil Scientist Certification through The Soil Science Society of America.

#### **CAREER OPPORTUNITIES**

The Certificate in Environmental Soil Science provides an attractive addition to a science, engineering, or allied science major for students interested in careers in environmental sciences, agricultural science, natural resources, and other related industries. Students in majors across campus can also use the certificate to diversify their skills and knowledge to be better informed citizens.

Questions about advising or careers may be directed to the certificate advisor listed in the contact box.

### WISCONSIN EXPERIENCE

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Students in the Certificate in Environmental Soil Science are involved in an array of opportunities across campus. Students are highly encouraged to complement their coursework with out-of-classroom experiences such as research (https://soilenvsci.wisc.edu/research-and-extension/ research/), volunteering (https://morgridge.wisc.edu/), internships (https://cals.wisc.edu/academics/undergraduate-students/ outside-the-classroom/internships/), and study abroad (https:// www.studyabroad.wisc.edu/).

Students in the certificate can participate in the UW-Madison Soil Judging Team.

#### CERTIFICATION/LICENSURE

### CERTIFICATION/LICENSURE CERTIFIED PROFESSIONAL SOIL SCIENTIST

There may be additional requirements for students seeking a Professional Soil Scientist certification beyond the Certificate requirements. Work with your advisor to ensure that you complete courses that will meet requirements for the Professional Soil Scientist Certification through The Soil Science Society of America.

Please refer to https://www.soils.org/certifications/become-certified/ for current requirements.

#### **RESOURCES AND SCHOLARSHIPS**

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Financial support in the form of scholarships, part-time employment, paid internships, and work-study programs is available to qualified undergraduate students. Students with a primary major in the College of Agricultural and Life Sciences receive more than \$1.25 million in scholarships annually. Additionally, the Department of Soil and Environmental Sciences is proud to offer numerous scholarships annually to students pursuing the Certificate in Environmental Soil Science.