

# SOIL SCIENCE, B.S.

The Department of Soil Science provides undergraduate and graduate education in agricultural, environmental, and natural resource aspects of soils. Areas of emphasis include soil ecology; soil erosion and tillage management; soil fertility and plant nutrition; soil physicochemical phenomena; fate of soil contaminants; waste management; water and contaminant transport; pedology; and land use analysis. Soils are a critical natural resource in environmental protection, food and fiber production, turf and grounds management, rural and urban planning, and waste disposal. All of these facets of soils and soil science are integrated into the department's course offerings and research programs. Soil science majors prepare for professional, technical, consulting, and administrative positions in such areas as the environmental sciences, ecology and restoration, crop and timber production, soil survey, and informatics, conservation, environmental pollution control, turf and grounds management, and land-use planning. Contact the department for further information on career opportunities.

Students completing an undergraduate major in soil science earn a Bachelor of Science degree. A problem-solving "capstone course" that integrates knowledge gleaned from a diversity of courses is required.

## HOW TO GET IN

To declare this major, students must be admitted to UW–Madison and the College of Agricultural and Life Sciences (CALs). For information about becoming a CALs first-year or transfer student, see Entering the College (<http://guide.wisc.edu/undergraduate/agricultural-life-sciences/#enteringthecolletext>).

Students who attend Student Orientation, Advising, and Registration (SOAR) with the College of Agricultural and Life Sciences have the option to declare this major at SOAR. Students may otherwise declare after they have begun their undergraduate studies. For more information, contact the advisor listed under the Advising and Careers tab.

## REQUIREMENTS

### UNIVERSITY GENERAL EDUCATION REQUIREMENTS

All undergraduate students at the University of Wisconsin–Madison are required to fulfill a minimum set of common university general education requirements to ensure that every graduate acquires the essential core of an undergraduate education. This core establishes a foundation for living a productive life, being a citizen of the world, appreciating aesthetic values, and engaging in lifelong learning in a continually changing world. Various schools and colleges will have requirements in addition to the requirements listed below. Consult your advisor for assistance, as needed. For additional information, see the university Undergraduate General Education Requirements (<http://guide.wisc.edu/undergraduate/#requirementsforundergraduatestudytext>) section of the *Guide*.

### Requirements Detail

General	• Breadth—Humanities/Literature/Arts: 6 credits
Education	• Breadth—Natural Science: 4 to 6 credits, consisting of one 4- or 5-credit course with a laboratory component; or two courses providing a total of 6 credits
	• Breadth—Social Studies: 3 credits
	• Communication Part A & Part B *
	• Ethnic Studies *
	• Quantitative Reasoning Part A & Part B *

\* The mortarboard symbol appears before the title of any course that fulfills one of the Communication Part A or Part B, Ethnic Studies, or Quantitative Reasoning Part A or Part B requirements.

## COLLEGE OF AGRICULTURAL AND LIFE SCIENCES REQUIREMENTS

In addition to the University General Education Requirements, all undergraduate students in CALs must satisfy a set of college and major requirements. Specific requirements for all majors in the college and other information on academic matters can be obtained from the Office of Academic Affairs (<http://www.cals.wisc.edu/academics>), College of Agricultural and Life Sciences, 116 Agricultural Hall, 1450 Linden Drive, Madison, WI 53706; 608-262-3003. Academic departments and advisors also have information on requirements. Courses may not double count within university requirements (General Education and Breadth) or within college requirements (First-Year Seminar, International Studies and Science), but courses counted toward university requirements may also be used to satisfy a college and/or a major requirement; similarly, courses counted toward college requirements may also be used to satisfy a university and/or a major requirement.

### COLLEGE REQUIREMENTS FOR ALL CALS B.S. DEGREE PROGRAMS

Code	Title	Credits
	Quality of Work: Students must maintain a minimum cumulative grade point average of 2.000 to remain in good standing and be eligible for graduation.	
	Residency: Students must complete 30 degree credits in residence at UW–Madison after earning 86 credits toward their undergraduate degree.	
	First Year Seminar ( <a href="http://guide.wisc.edu/undergraduate/agricultural-life-sciences/#requirementstext">http://guide.wisc.edu/undergraduate/agricultural-life-sciences/#requirementstext</a> )	1
	International Studies ( <a href="http://guide.wisc.edu/undergraduate/agricultural-life-sciences/#requirementstext">http://guide.wisc.edu/undergraduate/agricultural-life-sciences/#requirementstext</a> )	3
	Physical Science Fundamentals	4-5
CHEM 103 or CHEM 108 or CHEM 109	General Chemistry I Chemistry in Our World Advanced General Chemistry	
	Biological Science	5
	Additional Science (Biological, Physical, or Natural)	3
	Science Breadth (Biological, Physical, Natural, or Social)	3

CALS Capstone Learning Experience: included in the requirements for each CALS major (see "Major Requirements") (<http://guide.wisc.edu/undergraduate/agricultural-life-sciences/#requirements>)

## MAJOR REQUIREMENTS

Courses may not double count within the major (unless specifically noted otherwise), but courses counted toward the major requirements may also be used to satisfy a university requirement and/or a college requirement. A minimum of 15 credits must be completed in the major that are not used elsewhere.

Code	Title	Credits
<b>Mathematics and Statistics</b>		
Select one of the following courses:		3-5
MATH 112	Algebra	
MATH 114	Algebra and Trigonometry	
MATH 171	Calculus with Algebra and Trigonometry I <sup>1</sup>	
Select one of the following courses:		3-4
STAT 371	Introductory Applied Statistics for the Life Sciences (recommended)	
STAT/F&W ECOL/ HORT 571	Statistical Methods for Bioscience I	
<b>Chemistry</b>		
Select one of the following options:		5-9
Option 1:		
CHEM 103 & CHEM 104	General Chemistry I and General Chemistry II	
Option 2:		
CHEM 109	Advanced General Chemistry	
<b>Biology</b>		
Select one of the following options:		10
Option 1 (recommended):		
BOTANY/ BIOLOGY 130	General Botany <sup>2</sup>	
ZOOLOGY/ BIOLOGY 101	Animal Biology	
ZOOLOGY/ BIOLOGY 102	Animal Biology Laboratory	
Option 2:		
BIOLOGY/ BOTANY/ ZOOLOGY 151	Introductory Biology	
BIOLOGY/ BOTANY/ ZOOLOGY 152	Introductory Biology	
Option 3:		
BIOCORE 381	Evolution, Ecology, and Genetics	
BIOCORE 382	Evolution, Ecology, and Genetics Laboratory	
BIOCORE 383	Cellular Biology	
BIOCORE 384	Cellular Biology Laboratory	
<b>Core</b>		
SOIL SCI 301	General Soil Science	4

SOIL SCI 325	Soils and Landscapes	3
Select one of the following courses:		3
SOIL SCI 321	Soils and Environmental Chemistry	
SOIL SCI 621	Soil Chemistry	
SOIL SCI/ AGRONOMY/ HORT 326	Plant Nutrition Management	
SOIL SCI/ BOTANY/ HORT 626	Mineral Nutrition of Plants	
Select one of the following courses:		3
SOIL SCI 322	Physical Principles of Soil and Water Management	
SOIL SCI 622	Soil Physics	
Select one of the following courses:		3
SOIL SCI/ PL PATH 323	Soil Biology	
SOIL SCI/ MICROBIO 425	Environmental Microbiology	
SOIL SCI/ MICROBIO 523	Soil Microbiology and Biochemistry	
<b>Specialization</b>		
Students must complete 1 of 3 specializations: 1. Environmental Soil Science 2. Soil and Food Systems 3. Turf and Grounds (see below)		28-51
<b>Capstone</b> <sup>3</sup>		
Select one of the following courses:		3-4
SOIL SCI 499	Soil Management <sup>4</sup>	
ENVIR ST/ SOIL SCI 575	Assessment of Environmental Impact	
F&W ECOL/A A E/ ENVIR ST 652	Decision Methods for Natural Resource Managers	
Total Credits		68-99

<sup>1</sup> Note that MATH 171 & MATH 217 must be taken as a sequence.

<sup>2</sup> BOTANY/BIOLOGY 130 is required by the Turf and Grounds Track.

<sup>3</sup> Consult advisor to request permission to substitute another course for the Capstone requirement. Course must meet CALS Capstone Characteristics described in the Undergraduate Catalog and be approved by advisor and 116 Ag Hall.

<sup>4</sup> SOIL SCI 499 capstone required for Turf and Grounds Track.

## SPECIALIZATIONS WITHIN THE MAJOR ENVIRONMENTAL SOIL SCIENCE

Code	Title	Credits
<b>Mathematics</b>		
Select one of the following courses:		5
MATH 211	Calculus	
MATH 221	Calculus and Analytic Geometry 1	
MATH 217	Calculus with Algebra and Trigonometry II	
<b>Physics</b>		
Select one of the following courses:		4-5
PHYSICS 103	General Physics (recommended)	
PHYSICS 104	General Physics	

PHYSICS 207	General Physics
PHYSICS 208	General Physics

**Chemistry**

Select one of the following options: 4-8

**Option 1:**

CHEM 311	Chemistry Across the Periodic Table
CHEM 327 or CHEM 329	Fundamentals of Analytical Science Fundamentals of Analytical Science

**Option 2:**

CHEM 341 & CHEM 342	Elementary Organic Chemistry and Elementary Organic Chemistry Laboratory
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**Option 3:**

CHEM 343 & CHEM 344 & CHEM 345	Introductory Organic Chemistry and Introductory Organic Chemistry Laboratory and Intermediate Organic Chemistry
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**Physical Environment** 6-8

Select one course from the following:

ATM OCN 100	Weather and Climate
ATM OCN 101	Weather and Climate
ATM OCN/ SOIL SCI 132	Earth's Water: Natural Science and Human Use
GEOG/ ENVIR ST 120	Introduction to the Earth System
GEOG/ ENVIR ST 127	Physical Systems of the Environment
GEOSCI/ ENVIR ST 106	Environmental Geology
GEOSCI 202	Introduction to Geologic Structures
SOIL SCI 321	Soils and Environmental Chemistry
SOIL SCI/ AGRONOMY/ HORT 326	Plant Nutrition Management

Select at least one course from the following:

GEOG/CIV ENGR 320	Geomorphology
GEOG 321	Climatology
ATM OCN/ GEOG 323	Science of Climate Change
GEOG/ ENVIR ST 325	Analysis of the Physical Environment
SOIL SCI/ ENVIR ST 324	Soils and Environmental Quality
SOIL SCI 431	Soils of the World
SOIL SCI/ F&W ECOL/ HORT 524	Urban Soil and Environment
SOIL SCI 621	Soil Chemistry
SOIL SCI 622	Soil Physics
SOIL SCI/ BOTANY/ HORT 626	Mineral Nutrition of Plants
AGRONOMY/ATM OCN/SOIL SCI 532	Environmental Biophysics

F&W ECOL/ LAND ARC/ ZOOLOGY 565	Principles of Landscape Ecology
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GEOG 578	GIS Applications
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**Living Environment** 9-14

Select one course from the following:

AGRONOMY 100	Principles and Practices in Crop Production
AGRONOMY 300	Cropping Systems
GEOG/ ENVIR ST 309	People, Land and Food: Comparative Study of Agriculture Systems
ZOOLOGY/ ENVIR ST 315	Limnology-Conservation of Aquatic Resources
HORT 345	Fruit Crop Production
HORT 370	World Vegetable Crops
AGROECOL 400	Study Abroad in Agroecology
SOIL SCI/ AGRONOMY/ BOTANY 370	Grassland Ecology
SOIL SCI/ MICROBIO 425	Environmental Microbiology
SOIL SCI/ MICROBIO 523	Soil Microbiology and Biochemistry

Select one course from the following:

BOTANY/F&W ECOL/ZOOLOGY 460	General Ecology
F&W ECOL 550 & F&W ECOL 551	Forest Ecology and Forest Ecology Lab
GENETICS 466	Principles of Genetics
BOTANY 500	Plant Physiology
SOIL SCI/ MICROBIO 523	Soil Microbiology and Biochemistry
GENETICS 545	Genetics Laboratory
BOTANY 563	Phylogenetic Analysis of Molecular Data
SOIL SCI/ BOTANY/ HORT 626	Mineral Nutrition of Plants
SOIL SCI/ CIV ENGR/ M&ENVTOX 631	Toxicants in the Environment: Sources, Distribution, Fate, & Effects

Select one of the following options:

**Option 1:**

MICROBIO 101 & MICROBIO 102	General Microbiology and General Microbiology Laboratory
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**Option 2:**

MICROBIO 303 & MICROBIO 304	Biology of Microorganisms and Biology of Microorganisms Laboratory
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**Option 3:**

BOTANY 330 & BOTANY/ PL PATH 332	Algae and Fungi
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**Environmental Policy, Management, and Analysis** 9-12

Select one of the following courses:

SOIL SCI/ENVIR ST 101	Forum on the Environment
ENVIR ST 112	Environmental Studies: The Social Perspective
ENVIR ST 113	Environmental Studies: The Humanistic Perspective
ENVIR ST/ILS 126	Principles of Environmental Science
ENVIR ST/GEOG 127	Physical Systems of the Environment
A A E/F&W ECOL 652	Decision Methods for Natural Resource Managers
SOIL SCI/ENVIR ST 575	Assessment of Environmental Impact
GEOG/ SOIL SCI 526	Human Transformations of Earth Surface Processes
ZOOLOGY 535	Ecosystem Analysis

Select one of the following courses:

ECON 101	Principles of Microeconomics
ECON 111	Principles of Economics-Accelerated Treatment
A A E 215	Introduction to Agricultural and Applied Economics
A A E/ ENVIR ST 244	The Environment and the Global Economy
A A E 319	The International Agricultural Economy
ENVIR ST/ M&ENVTOX/PL PATH 368	Environmental Law, Toxic Substances, and Conservation

Select one of the following courses:

ENVIR ST/ F&W ECOL/G L E/ GEOG/GEOSCI/ LAND ARC 371	Introduction to Environmental Remote Sensing
ENVIR ST/ F&W ECOL/G L E/ GEOG/GEOSCI/ LAND ARC 372	Intermediate Environmental Remote Sensing
ENVIR ST/LAND ARC/SOIL SCI 695	Applications of Geographic Information Systems in Natural Resources

Total Credits 37-52

**SOIL AND FOOD SYSTEMS**

Code	Title	Credits
<b>Physical Environment</b>		8-10

Select one of the following courses:

ATM OCN 100	Weather and Climate
SOIL SCI/ ATM OCN 132	Earth's Water: Natural Science and Human Use
ATM OCN 101	Weather and Climate
GEOG/ ENVIR ST 120	Introduction to the Earth System

GEOG/ ENVIR ST 127	Physical Systems of the Environment
GEOSCI 100	General Geology
GEOSCI/ ENVIR ST 106	Environmental Geology
SOIL SCI/ ENVIR ST 324	Soils and Environmental Quality
SOIL SCI 321	Soils and Environmental Chemistry
SOIL SCI/ AGRONOMY/ HORT 326	Plant Nutrition Management
SOIL SCI/ F&W ECOL 451	Environmental Biogeochemistry
SOIL SCI/ F&W ECOL/ HORT 524	Urban Soil and Environment

Select one of the following courses:

GEOG/CIV ENGR 320	Geomorphology
GEOG 321	Climatology
ATM OCN/ GEOG 323	Science of Climate Change
GEOG/ ENVIR ST 325	Analysis of the Physical Environment
SOIL SCI 431	Soils of the World
SOIL SCI/ MICROBIO 523	Soil Microbiology and Biochemistry
ZOOLOGY 535	Ecosystem Analysis
F&W ECOL/ ZOOLOGY 565	Principles of Landscape Ecology
GEOG 578	GIS Applications
GEOG 579	GIS and Spatial Analysis
SOIL SCI/ F&W ECOL 451	Environmental Biogeochemistry
SOIL SCI 621	Soil Chemistry
SOIL SCI 622	Soil Physics
SOIL SCI/ BOTANY/ HORT 626	Mineral Nutrition of Plants

Select one of the following courses:

ENVIR ST/ F&W ECOL/G L E/ GEOG/GEOSCI/ LAND ARC 371	Introduction to Environmental Remote Sensing
ENVIR ST/ F&W ECOL/G L E/ GEOG/GEOSCI/ LAND ARC 372	Intermediate Environmental Remote Sensing
ENVIR ST/LAND ARC/SOIL SCI 695	Applications of Geographic Information Systems in Natural Resources

**Economics and Food Management** 6-8

Select one of the following courses:

ACCT I S 100	Introductory Financial Accounting
ACCT I S 211	Introductory Managerial Accounting
ACCT I S 300	Accounting Principles

ACCT I S 301	Financial Reporting I	
ACCT I S/ LAW 329	Taxation: Concepts for Business and Personal Planning	
A A E 215	Introduction to Agricultural and Applied Economics	
A A E 320	Farming Systems Management	
A A E 322	Commodity Markets	
A A E 323	Cooperatives	
A A E 419	Agricultural Finance	
A A E/ECON 421	Economic Decision Analysis	
A A E/ECON 474	Economic Problems of Developing Areas	
M H R 305	Human Resource Management	
M H R 610	Compensation: Theory and Administration	
M H R 611	Personnel Staffing and Evaluation	
M H R 612	Labor-Management Relations	
Select one of the following courses:		
ECON 101	Principles of Microeconomics	
ECON 111	Principles of Economics-Accelerated Treatment	
ACCT I S 100	Introductory Financial Accounting	
ACCT I S 211	Introductory Managerial Accounting	
ACCT I S 300	Accounting Principles	
ACCT I S 301	Financial Reporting I	
ACCT I S/ LAW 329	Taxation: Concepts for Business and Personal Planning	
A A E 320	Farming Systems Management	
A A E 322	Commodity Markets	
A A E 323	Cooperatives	
A A E 419	Agricultural Finance	
A A E/ECON 421	Economic Decision Analysis	
A A E/ECON 474	Economic Problems of Developing Areas	
SOIL SCI/ MICROBIO 425	Environmental Microbiology	
SOIL SCI/ MICROBIO 523	Soil Microbiology and Biochemistry	
M H R 305	Human Resource Management	
M H R 610	Compensation: Theory and Administration	
M H R 611	Personnel Staffing and Evaluation	
M H R 612	Labor-Management Relations	
<b>Specialized Sciences (complete all)</b> <sup>1</sup>		
AGRONOMY 100	Principles and Practices in Crop Production	3-4
or HORT 120	Survey of Horticulture	
AGRONOMY 300	Cropping Systems	3
or AGRONOMY 302	Forage Management and Utilization	
or HORT 345	Fruit Crop Production	
AGRONOMY/HORT/ SOIL SCI 326	Plant Nutrition Management	3
PL PATH 300	Introduction to Plant Pathology	2-4
or ENTOM 351	Principles of Economic Entomology	

or PL PATH/ ENVIR ST/ M&ENVTOX 368	Environmental Law, Toxic Substances, and Conservation	
A A E 215	Introduction to Agricultural and Applied Economics	3
or A A E/ ENVIR ST 244	The Environment and the Global Economy	
or A A E 319	The International Agricultural Economy	
or A A E/ AGRONOMY/ INTER-AG/ NUTR SCI 350	World Hunger and Malnutrition	
Total Credits		28-35

<sup>1</sup> Some courses may fulfill GEN ED requirements.

## TURF AND GROUNDS

Code	Title	Credits
<b>Physical Environment</b>		
Select one of the following courses:		3
ATM OCN 100	Weather and Climate	
ATM OCN 101	Weather and Climate	
SOIL SCI/ ATM OCN 132	Earth's Water: Natural Science and Human Use	
GEOG/ ENVIR ST 120	Introduction to the Earth System	
GEOG/ ENVIR ST 127	Physical Systems of the Environment	
GEOSCI 100	General Geology	
GEOSCI/ ENVIR ST 106	Environmental Geology	
<b>Core Turf and Grounds Sciences (complete all)</b>		
ACCT I S 300	Accounting Principles	3
BOTANY/ BIOLOGY 130	General Botany <sup>1</sup>	5
HORT/PL PATH 261	Sustainable Turfgrass Use and Management	2
M H R 305	Human Resource Management	3
PL PATH 300	Introduction to Plant Pathology	4
HORT/SOIL SCI 332	Turfgrass Nutrient and Water Management	3
Specialized Sciences		7
Select 7 credits from the following courses:		
BOTANY/F&W ECOL 402	Dendrology	
HORT/ LAND ARC 263	Landscape Plants I	
BSE 201	Land Surveying Fundamentals	
BSE 243	Operating and Management Principles of Off-Road Vehicles	
ENTOM 351	Principles of Economic Entomology	
HORT 120	Survey of Horticulture	
HORT/ PL PATH 262	Turfgrass Management Laboratory	

HORT 461	Advanced Turfgrass Management and Physiology
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<sup>1</sup> Counts toward Soil Science Major Biology requirements, above.

## HONORS IN THE MAJOR

To earn Honors in the Major, students are required to take at least 20 honors credits. In addition, students must take SOIL SCI 681 Senior Honors Thesis and SOIL SCI 682 Senior Honors Thesis when completing their thesis project; please see the Honors in Major Checklist (<http://www.cals.wisc.edu/academics/undergraduate-programs/get-involved/honors-program/honors-in-the-major>) for more information.

## UNIVERSITY DEGREE REQUIREMENTS

### Requirements Detail

**Total Degree** To receive a bachelor's degree from UW–Madison, students must earn a minimum of 120 degree credits. The requirements for some programs may exceed 120 degree credits. Students should consult with their college or department advisor for information on specific credit requirements.

**Residency** Degree candidates are required to earn a minimum of 30 credits in residence at UW–Madison. "In residence" means on the UW–Madison campus with an undergraduate degree classification. "In residence" credit also includes UW–Madison courses offered in distance or online formats and credits earned in UW–Madison Study Abroad/Study Away programs.

**Quality of Work** Undergraduate students must maintain the minimum grade point average specified by the school, college, or academic program to remain in good academic standing. Students whose academic performance drops below these minimum thresholds will be placed on academic probation.

## LEARNING OUTCOMES

### LEARNING OUTCOMES

- To instill in our undergraduate majors the knowledge base required for them to intelligently discuss, debate and communicate those aspects of soil science pertinent to their degree, specialization and career goals.
- To provide our undergraduates with the skills and experience needed to identify and solve problems and issues of the types they may encounter in their professions.
- To ensure that our undergraduates possess an awareness of and an appreciation for the potential impacts of soil, water, crop and waste management practices, and land use on the quality of the environment.

## FOUR-YEAR PLAN

### FOUR-YEAR PLAN

#### SAMPLE SOIL SCIENCE FOUR-YEAR PLAN—SOIL & FOOD SYSTEMS SPECIALIZATION; TURF AND GROUND SPECIALIZATION

##### Freshman

Fall	Credits Spring	Credits
CHEM 103 or 109	4-5 CHEM 104	5
MATH 114 or 171	5 ETHNIC STUDIES	3
FIRST YEAR SEMINAR	1 ELECTIVES	7-8
COMM-A/ELECTIVES	3-4	
	13-15	15-16

Total Credits 28-31

##### Sophomore

Fall	Credits Spring	Credits
BOTANY/BIOLOGY 130 or ZOOLOGY 151 <sup>1</sup>	5 ZOOLOGY/BIOLOGY 101 & ZOOLOGY/BIOLOGY 102	5
SOIL SCI 301	4 COMM-B/ELECTIVES	3
INTERNATIONAL STUDIES	3 SPECIALIZATION COURSE	4-5
ELECTIVES	3 ELECTIVES	3
	15	15-16

Total Credits 30-31

##### Junior

Fall	Credits Spring	Credits
SOIL SCI 321	3 SOIL SCI 322	3
SOIL SCI 325	3 SOIL SCI/PL PATH 323	3
STATISTICS	3 SPECIALIZATION COURSES/ELECTIVES	9-10
SPECIALIZATION COURSE/ELECTIVES	3	
	12	15-16

Total Credits 27-28

##### Senior

Fall	Credits Spring	Credits
SOIL SCI 499 (Capstone)	3 SPECIALIZATION COURSES/ELECTIVES	15-16
SPECIALIZATION COURSES/ELECTIVES	12	
	15	15-16

Total Credits 30-31

<sup>1</sup> Botany 130 and Zoo 101/102 is required for Turf and Grounds Track.

## SAMPLE SOIL SCIENCE FOUR-YEAR PLAN— ENVIRONMENTAL SOIL SCIENCE SPECIALIZATION

### Freshman

Fall	Credits Spring	Credits
CHEM 103 or 109	4-5 CHEM 104	5
MATH 114 or 171	5 ETHNIC STUDIES	3
FIRST YEAR SEMINAR	1 ELECTIVES	7-8
COMM-A/ELECTIVES	3-4	
	13-15	15-16

Total Credits 28-31

### Sophomore

Fall	Credits Spring	Credits
BOTANY/BIOLOGY 130 or ZOOLOGY 151	5 ZOOLOGY/BIOLOGY 101 & ZOOLOGY/ BIOLOGY 102	5
SOIL SCI 301	4 Specialization Course	4-5
INTERNATIONAL STUDIES	3 ELECTIVES	3
ELECTIVES	3 COMM-B/ELECTIVES	3
	15	15-16

Total Credits 30-31

### Junior

Fall	Credits Spring	Credits
SOIL SCI 321	3 SOIL SCI 322	3
SOIL SCI 325	3 SOIL SCI/PL PATH 323	3
SPECIALIZATION COURSES/ELECTIVES	3 SPECIALIZATION COURSES/ELECTIVES	9-10
STATISTICS	3	
	12	15-16

Total Credits 27-28

### Senior

Fall	Credits Spring	Credits
SOIL SCI 499 (Capstone)	3 SPECIALIZATION COURSES/ELECTIVES	15-16
SPECIALIZATION COURSES/ELECTIVES	12	
	15	15-16

Total Credits 30-31

## ADVISING AND CAREERS

### ADVISING AND CAREERS

Students are assigned a faculty advisor once they declare the major. Prospective students should contact the undergraduate coordinator, Julie Garvin (jgarvin2@wisc.edu, 608-262-2239), with questions.

Most of our graduates find employment in a diversity of private and commercial enterprises and governmental agencies. Recent examples of employment include laboratory technician, turf and grounds manager, agrichemical sales representative, environmental scientist, land use planner, land zoning administrator, project manager, soil surveyor, and

hydrogeologist. Approximately 12 percent of our undergraduates pursue advanced degrees.

## PEOPLE

### FACULTY

**Assistant Professor Francisco Arriaga**—fariaga@wisc.edu

Applied Soil Physics, Soil and Water Management and Conservation: Conservation agriculture systems; development of conservation tillage practices that enhance soil quality, soil hydraulic properties, and plant water use through the adoption of cover crops and non-inversion tillage for traditional cropping systems.

**Associate Professor Nicholas Balster**—njbalsster@wisc.edu

Soil Ecology, Plant Physiological Ecology, and Education: Energy and material cycling in natural and anthropogenic soils including forests, grasslands, and urban ecosystems; stable isotope ecology; environmental education; nutrition management of nursery soils; tree physiology, production and response; ecosystem response to global change; urban ecosystem processes; invasive plant ecology; biodiversity.

**Professor Phillip Barak**—pwbarak@wisc.edu

Soil Chemistry and Plant Nutrition: Nutrient cycling; nutrient recovery from wastewater; molecular visualization of soil minerals and molecules; soil acidification.

**Professor William Bleam**—wfbbleam@wisc.edu

Surface and Colloid Chemistry: Physical chemistry of soil colloids and sorption processes, chemistry of humic substances, factors controlling biological availability of contaminants to microorganisms, magnetic resonance and synchrotron studies of adsorption and precipitation.

**Professor Alfred Hartemink**—hartemink@wisc.edu

Pedology, Digital Soil Mapping: Application of fundamental soil science to real-world problems; digital soil mapping; history and philosophy of soil science; pedology, soil survey, and soil information systems.

**Professor William Hickey**—wjhickey@wisc.edu

Soil Microbiology and Biochemistry: Soil microbiology, biodegradation, environmental toxicants, molecular physiology, functional genomics, microbial nanostructure, biotechnology.

**Professor Carrie Laboski**—laboski@wisc.edu

Soil Fertility and Nutrient Management: Sustaining agricultural production and environmental quality; elucidate the biogeochemistry and subsequent best management practices for N, P, and K fertilizers and animal manures; soil fertility related to lime, secondary, and micronutrients; evaluation of soil and plant diagnostic tests; development of tools to assist producers, ag. professionals, and regulatory agencies to sustain economically sound production of grain and forage crops.

**Professor Sharon Long**—slong@wisc.edu

Applied Environmental and Public Health Microbiology: Microbial source tracking indicators in watershed management; improving detection and quantification, environmental ecology of indicator organisms and infectious diseases, microbial community structure and function in contaminated systems, microbial safety of wastewater sludge and biosolids, biotreatability assessment.

**Professor Joel Pedersen**—joelpedersen@wisc.edu

Environmental Chemistry/Biochemistry: Behavior of organic contaminants, macromolecules, and engineered nanoparticles in natural and engineered environments.

**Professor J. Mark Powell**—jmpowel2@wisc.edu

Agroecology/Soil Fertility/International Agriculture: Environmental impacts of ruminant livestock, nutrient cycling, effects of livestock manure on soil nitrogen, phosphorus and carbon cycling and crop productivity; integrated nutrient management on dairy farms.

**Associate Professor Matthew Ruark**—mdruark@wisc.edu

Soil Fertility and Nutrient Management: Soil fertility and management of grain biofuel, and vegetable crops; cover crop management; agricultural production and water quality; sustainability of dairy cropping systems; soil organic matter management.

**Associate Professor Douglas Soldat**—djsoldat@wisc.edu

Turfgrass and Urban Soils—Turfgrass, urban soils, nutrient management, water resources, soil testing, landscape irrigation; soil contamination.

**Professor Stephen Ventura**—sventura@wisc.edu

Geographic Information Systems (Joint w/Nelson Institute for Environmental Studies): Geographic information systems (GIS), biofuels and production on marginal lands, public participation GIS, urban agriculture, land-scape process modeling, soil survey and soil information systems, land and resource tenure, GIS and land use planning.

**Assistant Professor Thea Whitman**—twhitman@wisc.edu

Soil Ecology, Microbiology, and Biogeochemistry: Soil microbial ecology; organic matter decomposition and carbon stabilization; global environmental change; stable isotopes; linking functional significance of microbial communities with ecosystem processes; fire effects on soil carbon and microbes; management and policy.

## RESOURCES AND SCHOLARSHIPS

### RESOURCES AND SCHOLARSHIPS

Financial support—in the form of approximately 15 scholarships, part-time employment, paid internships, and work-study programs—is available to qualified undergraduate students. The department also provides opportunities and limited financial support in the form of research assistantships to qualified students seeking M.S. and/or Ph. D. degrees—see the Graduate Guide (<http://guide.wisc.edu/graduate>).