SOIL SCIENCE, B.S.

The Department of Soil Science provides undergraduate and graduate education in the environmental, agricultural, and natural resource aspects of soils. Areas of emphasis include soil ecology; soil erosion management; soil fertility and plant nutrition; soil physical and chemical characterization; biogeochemistry; urban soils; soil carbon; soil health; soil contaminants; waste management; 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 are integrated into the department’s course offerings and research programs. Soil science majors prepare for professional, technical, consulting, and project positions in environmental sciences, ecology and restoration, crop and timber production, soil informatics, soil conservation, environmental pollution control, turf and grounds management, and land-use planning. Please 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/#enteringthecollegetext).

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 in the Contact Box for the major.

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.

General Education

• Breadth— Humanities/Literature/Arts: 6 credits
• 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. Courses may not double count within university requirements (General Education and Breadth) or within college requirements (First-Year Seminar, International Studies, Science, and Capstone), 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

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>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.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Residency: Students must complete 30 degree credits in residence at UW–Madison after earning 86 credits toward their undergraduate degree.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>First Year Seminar (<a href="http://guide.wisc.edu/undergraduate/agricultural-life-sciences/#CALSFirstYearSeminarCourses">http://guide.wisc.edu/undergraduate/agricultural-life-sciences/#CALSFirstYearSeminarCourses</a>)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>International Studies (<a href="http://guide.wisc.edu/undergraduate/agricultural-life-sciences/#CALSInternationalStudiesCourses">http://guide.wisc.edu/undergraduate/agricultural-life-sciences/#CALSInternationalStudiesCourses</a>)</td>
<td>3</td>
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<tr>
<td>Physical Science Fundamentals</td>
<td>4-5</td>
<td></td>
</tr>
<tr>
<td>CHEM 103 or CHEM 108 or CHEM 109</td>
<td>General Chemistry I or Chemistry in Our World or Advanced General Chemistry</td>
<td></td>
</tr>
<tr>
<td>Biological Science</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Additional Science (Biological, Physical, or Natural)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Science Breadth (Biological, Physical, Natural, or Social)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>CALS Capstone Learning Experience: included in the requirements for each CALS major (see “Major Requirements”) (<a href="http://guide.wisc.edu/undergraduate/agricultural-life-sciences/#CALSCapstoneRequirement">http://guide.wisc.edu/undergraduate/agricultural-life-sciences/#CALSCapstoneRequirement</a>)</td>
<td></td>
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</tr>
</tbody>
</table>
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.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td><strong>Mathematics and Statistics</strong></td>
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<tr>
<td>Select one of the following courses:</td>
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<tr>
<td>MATH 112</td>
<td>Algebra</td>
<td></td>
</tr>
<tr>
<td>MATH 114</td>
<td>Algebra and Trigonometry</td>
<td></td>
</tr>
<tr>
<td>MATH 171</td>
<td>Calculus with Algebra and Trigonometry I</td>
<td></td>
</tr>
<tr>
<td>Select one of the following courses:</td>
<td></td>
<td>3-4</td>
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<tr>
<td>STAT 371</td>
<td>Introductory Applied Statistics for the Life Sciences (recommended)</td>
<td></td>
</tr>
<tr>
<td>STAT/F&amp;W ECOL/ HORT 571</td>
<td>Statistical Methods for Bioscience I</td>
<td></td>
</tr>
<tr>
<td><strong>Chemistry</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Select one of the following options:</td>
<td></td>
<td>5-9</td>
</tr>
<tr>
<td>Option 1:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHEM 103</td>
<td>General Chemistry I</td>
<td></td>
</tr>
<tr>
<td>&amp; CHEM 104</td>
<td>and General Chemistry II</td>
<td></td>
</tr>
<tr>
<td>Option 2:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHEM 109</td>
<td>Advanced General Chemistry</td>
<td></td>
</tr>
<tr>
<td><strong>Biology</strong></td>
<td></td>
<td></td>
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<tr>
<td>Select one of the following options:</td>
<td></td>
<td>10</td>
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<tr>
<td>Option 1 (recommended):</td>
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<td></td>
</tr>
<tr>
<td>BOTANY/ BIOLOGY 130</td>
<td>General Botany</td>
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<tr>
<td>ZOOLOGY/ BIOLOGY 101</td>
<td>Animal Biology</td>
<td></td>
</tr>
<tr>
<td>ZOOLOGY/ BIOLOGY 102</td>
<td>Animal Biology Laboratory</td>
<td></td>
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<tr>
<td>Option 2:</td>
<td></td>
<td></td>
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<tr>
<td>BIOLOGY/ BOTANY/ ZOOLOGY 151</td>
<td>Introductory Biology</td>
<td></td>
</tr>
<tr>
<td>BIOLOGY/ BOTANY/ ZOOLOGY 152</td>
<td>Introductory Biology</td>
<td></td>
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<tr>
<td>Option 3:</td>
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<tr>
<td>BIOCORE 381</td>
<td>Evolution, Ecology, and Genetics</td>
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<tr>
<td>BIOCORE 382</td>
<td>Evolution, Ecology, and Genetics Laboratory</td>
<td></td>
</tr>
<tr>
<td>BIOCORE 383</td>
<td>Cellular Biology</td>
<td></td>
</tr>
<tr>
<td>BIOCORE 384</td>
<td>Cellular Biology Laboratory</td>
<td></td>
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<tr>
<td><strong>Core</strong></td>
<td></td>
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</tr>
<tr>
<td>SOIL SCI 301 &amp; SOIL SCI 302</td>
<td>General Soil Science and Meet Your Soil: Soil Analysis and Interpretation Laboratory</td>
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<tr>
<td>SOIL SCI 325</td>
<td>Soils and Landscapes</td>
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<tr>
<td>Select one of the following courses:</td>
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<tr>
<td>MATH 211</td>
<td>Calculus</td>
<td></td>
</tr>
<tr>
<td>MATH 221</td>
<td>Calculus and Analytic Geometry I</td>
<td></td>
</tr>
<tr>
<td>MATH 217</td>
<td>Calculus with Algebra and Trigonometry II</td>
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</tr>
</tbody>
</table>

**Specialization**

Students must complete 1 of 3 specializations:
1. Environmental Soil Science
2. Soil and Food Systems
3. Turf and Grounds (see below)

**Capstone**

Select one of the following courses: 3-4

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOIL SCI 499</td>
<td>Soil Management</td>
<td>3</td>
</tr>
<tr>
<td>ENVIR ST/ SOIL SCI 575</td>
<td>Assessment of Environmental Impact</td>
<td>4</td>
</tr>
<tr>
<td>F&amp;W ECOL/A A E/ ENVIR ST 652</td>
<td>Decision Methods for Natural Resource Managers</td>
<td>3-4</td>
</tr>
</tbody>
</table>

**Total Credits**

68-99

1. Note that MATH 171 & MATH 217 must be taken as a sequence.
2. BOTANY/BIOLOGY 130 is required by the Turf and Grounds Track.
3. 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.
4. SOIL SCI 499 capstone required for Turf and Grounds Track.

**SPECIALIZATIONS WITHIN THE MAJOR**

**ENVIRONMENTAL SOIL SCIENCE**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mathematics</strong></td>
<td></td>
<td></td>
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<tr>
<td>Select one of the following courses:</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>MATH 211</td>
<td>Calculus</td>
<td></td>
</tr>
<tr>
<td>MATH 221</td>
<td>Calculus and Analytic Geometry I</td>
<td></td>
</tr>
<tr>
<td>MATH 217</td>
<td>Calculus with Algebra and Trigonometry II</td>
<td></td>
</tr>
</tbody>
</table>
Physics
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

Option 2:

- CHEM 341 Elementary Organic Chemistry
- & CHEM 342 and Elementary Organic Chemistry Laboratory

Option 3:

- CHEM 343 Organic Chemistry I
- & CHEM 344 and Introductory Organic Chemistry Laboratory
- & CHEM 345 and Organic Chemistry II

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 131 Earth's Soil: Natural Science and Human Use
- 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 Geomorphology 320
- ATM OCN/ GEOG 323 Science of Climate Change
- SOIL SCI/ ENVIR ST 324 Soils and Environmental Quality
- 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

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 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/ PL PATH 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

Option 2:

- MICROBIO 303 & MICROBIO 304 Biology of Microorganisms and Biology of Microorganisms Laboratory

Option 3:
BOTANY 330 & BOTANY/ PL PATH 332

Environmental Science, B.S.

Soil Science, B.S.

Environmental Policy, Management, and Analysis 9-12

Select one of the following courses:

SOIL SCI/ENVIR ST 101 Forum on the Environment
ENVR ST 112 Environmental Studies: Social Science Perspectives
ENVR ST 113 Environmental Studies: Environmental Humanities
ENVR ST/ILS 126 Principles of Environmental Science
ENVR 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

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/ ENVR ST 244 The Environment and the Global Economy
A A E 319 The International Agricultural Economy

Select one of the following courses:

ENVR ST/ F&W ECOL/ G L E/GEOG/ GEOSCI/ LAND ARC 371 Introduction to Environmental Remote Sensing
ENVR 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

Physical Environment 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
ATM OCN/ GEOG 323 Science of Climate Change

Select one of the following courses:

GEOG/ ENVIR ST 120 Introduction to the Earth System
GEOG/ ENVIR ST 127 Physical Systems of the Environment
GEOSCI 100 Introductory Geology: How the Earth Works
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:

F&W ECOL/ ZOOLOGY 565 Principles of Landscape Ecology
GEOG/CIV ENGR 320 Geomorphology
GEOG 578 GIS Applications
GEOG 579 GIS and Spatial Analysis
SOIL SCI 131 Earth’s Soil: Natural Science and Human Use
SOIL SCI/ F&W ECOL/ 451 Environmental Biogeochemistry
SOIL SCI/ MICROBIO 523 Soil Microbiology and Biochemistry
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:

ENVR ST/ F&W ECOL/ G L E/GEOG/ GEOSCI/ LAND ARC 371 Introduction to Environmental Remote Sensing
ENVR 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 IS 301  Financial Reporting I
ACCT IS/ LAW 329  Taxation: Concepts for Business and Personal Planning
A A E 215  Introduction to Agricultural and Applied Economics
A A E 320  Agricultural Systems Management
A A E 322  Commodity Markets
A A E 323  Cooperatives and Alternative Forms of Enterprise Ownership
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  Strategic Talent Management
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 IS 100  Introductory Financial Accounting
ACCT IS 211  Introductory Managerial Accounting
ACCT IS 300  Accounting Principles
ACCT IS 301  Financial Reporting I
ACCT IS/LAW 329  Taxation: Concepts for Business and Personal Planning
A A E 215  Introduction to Agricultural and Applied Economics
A A E 320  Agricultural Systems Management
A A E 322  Commodity Markets
A A E 323  Cooperatives and Alternative Forms of Enterprise Ownership
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  Strategic Talent Management
M H R 612  Labor-Management Relations

Specialized Sciences (complete all) 1
AGRONOMY 100  Principles and Practices in Crop Production  3-4
or HORT 120  Survey of Horticulture
AGRONOMY 300  Cropping Systems  3
or AGRONOMY 30E 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  3-4
or ENTOM 351  Principles of Economic Entomology
A A E 215  Introduction to Agricultural and Applied Economics  3-4
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/NUTR SCI 350  World Hunger and Malnutrition

Total Credits  29-36

1 Some courses may fulfill GEN ED requirements.

TURF AND GROUNDS

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td></td>
<td><strong>Physical Environment</strong></td>
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<td></td>
<td>Select one of the following courses:</td>
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<tr>
<td>ATM OCN 100</td>
<td>Weather and Climate</td>
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</tr>
<tr>
<td>ATM OCN 101</td>
<td>Weather and Climate</td>
<td></td>
</tr>
<tr>
<td>SOIL SCI/ATM OCN 132</td>
<td>Earth’s Water: Natural Science and Human Use</td>
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</tr>
<tr>
<td>GEOG/ENVIR ST 120</td>
<td>Introduction to the Earth System</td>
<td></td>
</tr>
<tr>
<td>GEOG/ENVIR ST 127</td>
<td>Physical Systems of the Environment</td>
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</tr>
<tr>
<td>GEOSCI 100</td>
<td>Introductory Geology: How the Earth Works</td>
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</tr>
<tr>
<td>GEOSCI/ENVIR ST 106</td>
<td>Environmental Geology</td>
<td></td>
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<tr>
<td></td>
<td><strong>Core Turf and Grounds Sciences (complete all)</strong></td>
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</tr>
<tr>
<td>ACCT IS 300</td>
<td>Accounting Principles</td>
<td>3</td>
</tr>
<tr>
<td>BOTANY/BIOLOGY 130</td>
<td>General Botany 1</td>
<td>5</td>
</tr>
<tr>
<td>HORT/PL PATH 261</td>
<td>Sustainable Turfgrass Use and Management</td>
<td>2</td>
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<tr>
<td>M H R 305</td>
<td>Human Resource Management</td>
<td>3</td>
</tr>
<tr>
<td>PL PATH 300</td>
<td>Introduction to Plant Pathology</td>
<td>4</td>
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<tr>
<td>HORT/SOIL SCI 332</td>
<td>Turfgrass Nutrient and Water Management</td>
<td>3</td>
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<tr>
<td></td>
<td><strong>Specialized Sciences</strong></td>
<td>7</td>
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<td>Select 7 credits from the following courses:</td>
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<tr>
<td>BOTANY/F&amp;W ECOL 402</td>
<td>Dendrology</td>
<td></td>
</tr>
<tr>
<td>HORT/LAND ARC 263</td>
<td>Landscape Plants I</td>
<td></td>
</tr>
<tr>
<td>BSE 243</td>
<td>Operating and Management Principles of Off-Road Vehicles</td>
<td></td>
</tr>
<tr>
<td>BSE 301</td>
<td>Land Information Management</td>
<td></td>
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<tr>
<td>ENTOM 351</td>
<td>Principles of Economic Entomology</td>
<td></td>
</tr>
<tr>
<td>HORT 120</td>
<td>Survey of Horticulture</td>
<td></td>
</tr>
<tr>
<td>HORT/PL PATH 262</td>
<td>Turfgrass Management Laboratory</td>
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</tr>
</tbody>
</table>
Counts toward Soil Science Major Biology requirements, above.

**HONORS IN THE MAJOR**

Students admitted to the university and to the College of Agricultural and Life Sciences are invited to apply to be considered for admission to the CALS Honors Program.

**Admission Criteria for New First-Year Students:**
- Complete program application including essay questions

**Admission Criteria for Transfer and Continuing UW-Madison Students:**
- UW-Madison cumulative GPA of at least 3.25
- Complete program application including essay questions

**HOW TO APPLY**

The application is available on the CALS Honors Program website ([https://cals.wisc.edu/academics/undergraduate/current-students/honors-program/](https://cals.wisc.edu/academics/undergraduate/current-students/honors-program/)). Applications are accepted at any time.

New first-year students with accepted applications will automatically be enrolled in Honors in Research. It is possible to switch to Honors in the Major in the student’s first semester on campus after receiving approval from the advisor for that major. Transfer and continuing students may apply directly to Honors in Research or Honors in the Major (after approval from the major advisor).

**REQUIREMENTS**

All CALS Honors programs have the following requirements:
- Earn at least a cumulative 3.25 GPA at UW-Madison (some programs have higher requirements)
- Complete the program-specific requirements listed below
- Submit completed thesis documentation to CALS Academic Affairs

**REQUIREMENTS**

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/](http://www.cals.wisc.edu/academics/undergraduate-programs/get-involved/honors-program/honors-in-the-major/)) for more information.

**UNIVERSITY DEGREE REQUIREMENTS**

**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**

1. 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.
2. 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.
3. 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**

**SAMPLE SOIL SCIENCE FOUR-YEAR PLAN **

—SOIL & FOOD SYSTEMS SPECIALIZATION; TURF AND GROUND SPECIALIZATION

<table>
<thead>
<tr>
<th>Freshman</th>
<th>Fall Credits</th>
<th>Spring Credits</th>
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<tbody>
<tr>
<td>CHEM 103 or 109</td>
<td>4-5</td>
<td>CHEM 104</td>
</tr>
<tr>
<td>MATH 114 or 171</td>
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<td>ETHNIC STUDIES</td>
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<tr>
<td>FIRST YEAR SEMINAR</td>
<td>1</td>
<td>ELECTIVES</td>
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<tr>
<td>COMM-A/ELECTIVES</td>
<td>3-4</td>
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<td></td>
<td>13-15</td>
<td>15-16</td>
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**Total Credits 28-31**

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<tr>
<th>Sophomore</th>
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<th>Spring Credits</th>
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<tbody>
<tr>
<td>BOTANY/BIOLOGY 130 or ZOOLOGY 151</td>
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<td>ZOOLOGY/BIOLOGY 101 &amp; ZOOLOGY/BIOLOGY 102</td>
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<tr>
<td>SOIL SCI 301</td>
<td>3</td>
<td>COMM-B/ELECTIVES</td>
</tr>
<tr>
<td>INTERNATIONAL STUDIES</td>
<td>3</td>
<td>SPECIALIZATION COURSE</td>
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<tr>
<td>ELECTIVES</td>
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<td>ELECTIVES</td>
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**Total Credits 29-30**
### Junior

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<tr>
<td>SOIL SCI 321</td>
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<td>SOIL SCI 322</td>
<td>3</td>
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<tr>
<td>SOIL SCI 325</td>
<td>3</td>
<td>SOIL SCI/PL PATH 323</td>
<td>3</td>
</tr>
<tr>
<td>STATISTICS</td>
<td>3</td>
<td>SPECIALIZATION COURSES/ELECTIVES</td>
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SPECIALIZATION COURSE/ELECTIVES 3

Total Credits 27-28

### Senior

<table>
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<tr>
<th>Fall</th>
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<th>Spring</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>SOIL SCI 499 (Capstone)</td>
<td>3</td>
<td>SPECIALIZATION COURSES/ELECTIVES</td>
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SPECIALIZATION COURSES/ELECTIVES 12

Total Credits 30-31

### STATISTICS

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<tbody>
<tr>
<td></td>
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<td>12</td>
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</table>

Total Credits 27-28

### 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, wetlands delineator, and hydrogeologist. Approximately 12% of our undergraduates pursue advanced degrees.

### PEOPLE

#### FACULTY

**Associate Professor Francisco Arriaga**

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.

**Professor Nicholas Balster**

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**

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

**Assistant Professor Zachary Freedman**

Soil microbiology, ecology and sustainability: Effects of environmental change on biogeochemical cycles; community...
ecology and trophic dynamics; forest soil ecology; soil organic matter dynamics; sustainable agroecosystems; bio-based product crop production on marginal lands.

**Professor Alfred Hartemink**

Pedology, Digital Soil Mapping: Pedology; soil carbon; digital soil mapping; tropical soils; history and philosophy of soil science.

**Assistant Professor Jingyi Huang**

Soil Physics, Proximal and Remote Sensing, Soil Monitoring and Management, Digital Soil Mapping: Application of proximal and remote sensing technologies for understanding the movement of water, heat, gas, and solutes in soils across different spatial and temporal scales; application of physical and empirical models for monitoring, mapping, and managing soil changes due to natural processes and human activities.

**Assistant Professor Inna Popova**

Environmental soil chemistry; understanding and mitigating the response of soil systems to the increased pressure of organic contaminants; application of biopesticides; development of novel separation and analyses methods for contaminants in environmental matrices.

**Professor Matthew Ruark**

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.

**Professor Douglas Soldat**

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

**Assistant Professor Thea Whitman**

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.

**Assistant Professor Xia Zhu-Barker**

Soil Biogeochemistry, Land Management, and Environmental Sustainability: Nitrogen and carbon biogeochemical cycles; greenhouse gas and air pollutant emissions; nitrate leaching and runoff; innovative manure and nutrient utilization; composting; climate change mitigation and adaptation; ecosystem services and carbon markets; dairy environmental sustainability; novel methods in isotopic techniques; mechanistic exploration of soil-plant-microbe interactions; process-based modelling. The specific research topics include:

- Microbial and abiotic processes involved in the production and consumption of nitrogen and carbon gases (N₂O, NOₓ, NH₃, CO₂, CH₄)
- Land management practices (e.g., compost, fertilizer, cover crops, irrigation, and tillage) that change soil health, nitrogen use efficiency, crop productivity, nitrogen losses, carbon turnover.
- Process oriented modelling of carbon/nitrogen turnover in agricultural ecosystems.
- Environmental changes on the sustainability and resilience of agricultural ecosystems especially dairy production systems.

**WISCONSIN EXPERIENCE**

Students majoring in 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://soils.wisc.edu/research-programs/), 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/).

**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/).