SOIL SCIENCE

Soil, Water, and Ecosystem Sciences involves managing land and water resources across a wide range of ecosystems, including agricultural, forested, range, urban and wetlands. Students strengthen their knowledge of the discipline in the classroom, through hands-on learning in the lab, and in the field. The major prepares students with skills to address real-world challenges in soil, water, and ecosystem resource assessment and management to make a positive impact on the environment.

About this Program

- **College:** Agricultural and Life Sciences (http://catalog.ufl.edu/UGRD/colleges-schools/UGAGL/)
- **School:** Natural Resources and Environment (http://catalog.ufl.edu/UGRD/colleges-schools/UGNTR/)
- **Degree:** Bachelor of Science
- **Specializations:** Soil Science (p. 1) | Water Science (http://catalog.ufl.edu/UGRD/colleges-schools/UGAGL/SWS_BS/SWS_BS02/)
- **Credits for Degree:** 120
- **More Info:** Soil Science (https://soils.ifas.ufl.edu/academics/-undergraduate-studies/soil-science-specialization/) | Water Science (https://soils.ifas.ufl.edu/academics/-undergraduate-studies/water-science-specialization/)

To graduate with this major, students must complete all university, college, and major requirements.

Department Information

The Soil, Water, and Ecosystem Sciences Department researches and teaches about soil, water, and environmental sciences in urban, agricultural, and natural ecosystems. Since its origins over 100 years ago, the department has made significant contributions to improving the productivity of Florida's agriculture, helping protect the state's unique ecosystems, and contributing to soil and water science at national and international levels.
Website (https://soils.ifas.ufl.edu/)

CONTACT

Email (soils-advising@ifas.ufl.edu) | 352.294.3`151

P.O. Box 110290
2181 MCCARTY HALL A
GAINESVILLE FL 32611-0290
Map (http://campusmap.ufl.edu/#/index/0495)

Curriculum

- Combination Degrees
- Environmental Management in Agriculture and Natural Resources | Interdisciplinary Studies
- Interdisciplinary Studies | Environmental Management in Agriculture and Natural Resources UF Online
- Soil, Water, and Ecosystem Sciences
- Soil, Water, and Ecosystem Sciences Minor

The Soil Science Specialization within the Soil, Water, and Ecosystem Sciences major equips students with the knowledge and practical skills needed to manage land and water resources across diverse ecosystems, including agricultural, forested, range, urban, and wetlands. The curriculum provides a robust foundation in soil science through a blend of core courses and flexible electives, allowing students to tailor their studies to match their academic and professional aspirations.

Students explore key areas such as soil and land use, environmental management, and the physical and biological sciences, with opportunities to delve into policy, economics, and business aspects. Hands-on learning through lab work, field experiences, and specialized coursework prepares students for careers in soil and resource conservation, sustainable agriculture, environmental education, and environmental policy.

Graduates are well-positioned for professional certifications, including becoming Certified Professional Soil Scientists (CPSS), Certified Crop Advisors (CCA), or Professional Wetland Scientists (PWS). With a comprehensive and flexible approach, this specialization fosters the expertise needed to address complex environmental challenges and contribute to a sustainable future.

Critical Tracking

Critical Tracking records each student's progress in courses that are required for progress toward each major. Please note the critical-tracking requirements below on a per-semester basis.

Equivalent critical-tracking courses as determined by the State of Florida Common Course Prerequisites (https://cpm.flvc.org/advance-search/) may be used for transfer students.

Semester 1

- Complete 2 of 5 critical courses, excluding labs: BSC 2005/BSC 2005L or BSC 2010/BSC 2010L, CHM 2045/CHM 2045L, CHM 2046/CHM 2046L, MAC 2311, PHY 2004/PHY 2004L
- 2.0 GPA required for all critical-tracking courses
- 2.0 UF GPA required

Semester 2

- Complete 1 additional critical-tracking course, excluding labs
- 2.0 GPA required for all critical-tracking courses
- 2.0 UF GPA required

Semester 3

- Complete 1 additional critical-tracking course, excluding labs
- 2.0 GPA required for all critical-tracking courses
- 2.0 UF GPA required

Semester 4

- Complete 1 additional critical-tracking course, excluding labs
- 2.0 GPA required for all critical-tracking courses
- 2.0 UF GPA required

Semester 5

- Complete all critical-tracking courses, including labs, from semesters 1 – 4
- 2.0 GPA required for all critical-tracking courses
- 2.0 upper division GPA required
- 2.0 UF GPA required

Semester 6

- Complete 1 additional tracking course
- 2.0 upper division GPA required.
- 2.0 UF GPA required

Semester 7

- Complete 2 additional tracking courses
- 2.0 upper division GPA required.
- 2.0 UF GPA required

Semester 8

- Complete all remaining tracking courses from semesters 5 - 8
- 2.0 upper division GPA required.
- 2.0 UF GPA required

Model Semester Plan

To remain on track, students must complete the appropriate critical-tracking courses, which appear in bold. These courses must be completed by the terms as listed above in the Critical Tracking criteria.

This semester plan represents an example progression through the major. Actual courses and course order may be different depending on the student's academic record and scheduling availability of courses. Prerequisites still apply.

Course	Title	Credits
Semester One		
Select one:		3-4
AEB 2014	Current Economic Issues, Food and You (Gen Ed Social and Behavioral Sciences)	
ECO 2013	Principles of Macroeconomics (Gen Ed Social and Behavioral Sciences)	
ECO 2023	Principles of Microeconomics (Gen Ed Social and Behavioral Sciences)	

Select one:		4
BSC 2005 & 2005L	Biological Sciences and Laboratory in Biological Science (**Critical Tracking**; State Core Gen Ed Biological and Physical Sciences)	
BSC 2010 & 2010L	Integrated Principles of Biology 1 and Integrated Principles of Biology Laboratory (**Critical Tracking**; State Core Gen Ed Biological and Physical Sciences)	
State Core Gen Ed Composition (http://catalog.ufl.edu/UGRD/academic-programs/general-education/#genedcoursestext); Writing Requirement		3
Elective		3
	Credits	**13-14**
Semester Two		
Quest 1 (Gen Ed Humanities)		3
MAC 2311	Analytic Geometry and Calculus 1 (**Critical Tracking**; State Core Gen Ed Mathematics)	4
MCB 2000 & 2000L	Microbiology and Microbiology Laboratory	4
State Core Gen Ed Social and Behavioral Sciences (http://catalog.ufl.edu/UGRD/academic-programs/general-education/#genedcoursestext)		3
Elective		2
	Credits	**16**
Semester Three		
Quest 2 (Gen Ed Social and Behavioral Science)		3
AEC 3030C or SPC 2608	Effective Oral Communication or Introduction to Public Speaking	3
CHM 2045 & 2045L	General Chemistry 1 and General Chemistry Laboratory (**Critical Tracking**; Gen Ed Physical Sciences)	4
Select one:		3-4
STA 2023	Introduction to Statistics 1 (Gen Ed Mathematics)	
MAC 2312	Analytic Geometry and Calculus 2 (Gen Ed Mathematics)	
Gen Ed Composition		3
	Credits	**16-17**
Semester Four		
CHM 2046 & 2046L	General Chemistry 2 and General Chemistry 2 Laboratory (**Critical Tracking**; Gen Ed Physical Sciences)	4
PHY 2004 & 2004L	Applied Physics 1 and Laboratory for Physics 2004 (**Critical Tracking**; Gen Ed Physical Sciences)	4
SWS 3022 & 3022L	Introduction to Soils in the Environment and Introduction to Soils in the Environment Laboratory (Gen Ed Physical Sciences)	4
State Core Gen Ed Humanities (http://catalog.ufl.edu/UGRD/academic-programs/general-education/#genedcoursestext)		3
	Credits	**15**
Semester Five		
Select one:		4
CHM 2200 & 2200L	Fundamentals of Organic Chemistry and Fundamentals of Organic Chemistry Laboratory	
CHM 3120 & 3120L	Introduction to Analytical Chemistry and Analytical Chemistry Laboratory	
SWS 4451	Soil and Water Chemistry	3
Approved electives		8
	Credits	**15**
Semester Six		
AEC 3033C	Research and Business Writing in Agricultural and Life Sciences (Writing Requirement)	3
SWS 4231C	Soil, Water and Land Use	3
SWS 4715C	Environmental Pedology (**Critical Tracking**)	4
Approved elective		3
	Credits	**13**
Summer After Semester Six		
SWS 4905 or SWS 4941	Individual Work or Full-time Practical Work Experience in Soil and Water Science	1-3
Approved elective		2
	Credits	**3-5**

Semester Seven		
SWS 4303C	Soil Microbial Ecology (**Critical Tracking**)	3
SWS 4602C	Soil Physics (**Critical Tracking**; State Core Gen Ed Physical Sciences)	3
Approved electives		10
	Credits	**16**
Semester Eight		
SWS 4244	Wetlands (**Critical Tracking**)	3
Approved electives		10-11
	Credits	**13-14**
	Total Credits	**120**

Approved Electives

Code	Title	Credits
ALS 3133	Agricultural and Environmental Quality	3
GEO 3162C	Introduction to Quantitative Analysis for Geographers	4
GEO 3250	Climatology	3
GEO 3280	Principles of Geographic Hydrology	4
GLY 1150L	Florida Geology Laboratory	1
SWS 2007	The World of Water	3
SWS 2008	Land and Life	3
SWS 4116	Environmental Nutrient Management	3
SWS 4180	Earth System Analysis	3
SWS 4207	Sustainable Agricultural and Urban Land Management	3
SWS 4223	Environmental Biogeochemistry	3
SWS 4233	Soil and Water Conservation	3
SWS 4245	Water Resource Sustainability	3
SWS 4307	Ecology of Waterborne Pathogens	3
SWS 4550	Soils, Water and Public Health	3
SWS 4720C	GIS in Soil and Water Science	3
SWS 4905	Individual Work	1-3
SWS 4911	Supervised Research in Soil and Water Science	3
SWS 4915	Honors Thesis Research in Soil and Water Science	3
SWS 4932	Special Topics in Soil and Water Science	1-3

Electives are chosen with the student's advisor. There are four areas of specialization: soil, water and land use, environmental soil and water management, physical sciences and biological sciences. The student is encouraged to take electives from a range of course groupings that include biology, building construction, chemistry, earth science, environmental science, hydrology, mathematics, physics, policy, production systems, programming and statistics.

Academic Learning Compact

The Soil, Water, and Ecosystem Sciences major enables students to identify and to describe the morphology of soils, to differentiate soils according to soil taxonomy and to distinguish soil forming factors. Students will use this knowledge to assess properties of soils in relation to plant growth and environmental uses and to apply this knowledge to different soil uses in agriculture, natural resources and urban settings.

Before Graduating Students Must

- Pass the soil and water sciences competency exam, given in four parts. One part will be given in each of these required courses:
  - SWS 3022
  - SWS 4451
  - SWS 4602C
  - SWS 4715C
- Satisfactorily complete an approved research project in SWS 4905 or SWS 4941.
- Achieve minimum grades of C in AEC 3030C and AEC 3033C. These courses are graded using rubrics developed by a faculty team.
- Complete requirements for the baccalaureate degree, as determined by faculty.

Students in the Major Will Learn to

Student Learning Outcomes | SLOs

Content

1. Apply fundamental principles of chemistry and physics in relation to critical zone processes in the pedosphere and hydrosphere.
2. Classify fundamental biological processes and differentiate basic organism function in soil and hydrologic systems.
3. Utilize field observations, case study evidence, and experimental data to describe soil formation, morphology, and interactions of the varied components of the hydrologic cycle.

Critical Thinking

4. Critically evaluate the sustainability of water resources in relation to human needs and natural ecosystem function.
5. Demonstrate quantitative problem-solving abilities by applying, analyzing, and synthesizing content knowledge related to soil and water chemistry and physics.

Communication

6. Create, interpret, and analyze written text, oral messages, and multimedia presentations used in agricultural and life sciences.

Curriculum Map

I = Introduced; R = Reinforced; A = Assessed

Courses	SLO 1	SLO 2	SLO 3	SLO 4	SLO 5	SLO 6
AEC 3030C						I, R, A
AEC 3033C						I, R, A
SWS 2007	I	I	I	I		
SWS 3022	I	I	I		I	
SWS 4245	R, A		R, A	R, A	R	R
SWS 4303C		R, A				R
SWS 4307		R, A				R
SWS 4451	R, A				R, A	
SWS 4602C	R, A		R			
SWS 4715C			R, A			

Assessment Types

- Case studies
- Field studies
- Lab assignments and reports
- Written analysis
- Exams