

WATER 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. Soil, Water, and Ecosystem Sciences students have a strong science and math background and study biology, calculus, microbiology, chemistry, physics, and ecology.

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 (http://catalog.ufl.edu/UGRD/colleges-schools/UGAGL/SWS_BS/SWS_BS01/) | Water Science (p. 1)
- **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/>)

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Map (<http://campusmap.ufl.edu/#/index/0495>)

Curriculum

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

Students are trained in managing land and water resources in a wide range of ecosystems, including agricultural, forested, range, urban and wetlands through different degree programs. Specializations within this degree program are designed to give the student a strong background in soil and water sciences with a core of required courses taken during their junior and senior years. Beyond the core courses, students can select from several groups of electives that provide flexibility in their program.

Students may also prepare for professional schools by selecting appropriate elective courses.

Specializations

Soil Science

Areas of study include soil and land use (with an emphasis on natural resources and the environment), environmental management (with an emphasis on agricultural and other applied aspects of soil sciences), physical and biological sciences (with an emphasis on physics, microbiology, botany, and other biological sciences) and business (with an emphasis on policy, economics, business administration, or entrepreneurship).

Water Science

Water's abundance, quality, distribution, and properties are essential to all people. Understanding water's role in the environment and in our lives is integral to the future of this important resource. Water science is an interdisciplinary specialization that provides students with opportunities to develop skills essential for a diversity of careers in both government and private sectors. Students work closely with advisors to develop a course of study tailored to their professional goals.

Critical Tracking

Critical Tracking records each student's progress in courses that are required for entry to 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
- Complete 1 additional tracking course
- 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, including labs 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	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 Sciences (Critical Tracking ; State Core Gen Ed Biological and Physical Sciences)	
BSC 2010 & 2010L	Integrated Principles of Biology 1 and Integrated Principles of Biology Laboratory 1 (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		4
		Credits
		14-15
Semester Two		
MCB 2000 & 2000L	Microbiology and Microbiology Laboratory	4
SWS 2007	The World of Water (Gen Ed Physical Sciences)	3
Quest 1 (Gen Ed Humanities)		3
State Core Gen Ed Social and Behavioral Sciences (http://catalog.ufl.edu/UGRD/academic-programs/general-education/#genedcoursestext)		3
Elective		2
		Credits
		15
Semester Three		
AEC 3030C or SPC 2608	Effective Oral Communication or Introduction to Public Speaking	3
CHM 2045 & 2045L	General Chemistry 1 and General Chemistry 1 Laboratory (Critical Tracking ; Gen Ed Physical Sciences)	4
MAC 2311	Analytic Geometry and Calculus 1 (Critical Tracking ; State Core Gen Ed Mathematics)	4
Gen Ed Composition; Writing Requirement		3
Elective		2
		Credits
		16
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 Applied Physics 1 (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)	
State Core Gen Ed Humanities (http://catalog.ufl.edu/UGRD/academic-programs/general-education/#genedcoursestext)		3
		Credits
		14-15
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 3022 & 3022L	Introduction to Soils in the Environment and Introduction to Soils in the Environment Laboratory (Gen Ed Biological and Physical Sciences; Critical Tracking)	4
SWS 4451	Soil and Water Chemistry	3
Approved elective		3
Elective		3
		Credits
		17

Semester Six

AEC 3033C	Research and Business Writing in Agricultural and Life Sciences (Writing Requirement; Critical Tracking)	3
SWS 4223	Environmental Biogeochemistry	3
SWS 4244	Wetlands	3
Approved electives		6
Credits		15

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

FNR 4660 or PUP 4224	Natural Resource Policy and Economics (Critical Tracking) or Florida Environmental Politics	3
SWS 4602C	Soil Physics (Gen Ed Physical Sciences; Critical Tracking)	3
Approved electives		7
Credits		13

Semester Eight

SWS 4245	Water Resource Sustainability (Critical Tracking)	3
SWS 4307	Ecology of Waterborne Pathogens	3
Approved electives		7-8
Credits		13-14
Total Credits		120

Approved Electives

Code	Title	Credits
ALS 3133	Agricultural and Environmental Quality	3
AOM 3734	Irrigation Principles and Practices in Florida	3
AOM 4643	Environmental Hydrology: Principles and Issues	3
EES 4201	Water Chemistry	3
EES 4401	Public Health Engineering	3
FAS 4305C	Introduction to Fishery Science	3
FNR 4343C	Forest Water Resources	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
GLY 3083C	Fundamentals of Marine Sciences	3
SWS 4231C	Soil, Water and Land Use	3
SWS 4233	Soil and Water Conservation	3
SWS 4550	Soils, Water and Public Health	3
SWS 4715C	Environmental Pedology	4
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. The student is encouraged to take electives from a range of course groupings that include biology, building construction, chemistry, earth science, environmental science, geology, hydrology, mathematics, physics, policy, production systems, programming, soils, 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
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