

Department of Plants,
Soils, and Climate
College of Agriculture

Soil Emphasis
Water Emphasis
Plant Emphasis

Published April 2008

Effective for students beginning degree Summer Sem. 2008 thru Spring Sem. 2009

Admission Requirements For This Major

1. New freshmen admitted to USU in good standing qualify for admission to this major.
2. Transfer students from other institutions need a 2.5 transfer GPA and students transferring from other USU majors need a 2.5 total GPA in courses required for this major to be accepted in good standing in Environmental Soil/Water Science.

The Program

The **Environmental Soil/Water Science Major** provides students with an understanding of the physical, chemical, and biological processes that occur in the soil-water zone at the earth's surface. With the ever-increasing magnitude and scope of the world's environmental challenges, there is an increasing demand for scientists to address society's needs for protecting and enhancing soil and water quality. Students graduating from this program will be well qualified for careers in the prevention, characterization, and amelioration of environmental soil and water problems. Graduates will fill the gap between engineers, geologists, and ecologists, and play a major role in ensuring that high-quality soil and water are available to current and future generations.

The **Environmental Soil/Water Science Major** is intended to provide each student with a fundamental understanding of the basic sciences and mathematics, as well as a strong background in both soil and water sciences. Preparatory requirements include chemistry, physics, mathematics, biology, geology, and statistics. The core courses for Environmental Soil/Water Science emphasize the interactive soil/water processes in the soil's plant-rooting zone—from the microscopic to the landscape perspective. From this base, each student can design his or her own program of specialization in one of the many aspects of soil science, water science, or the integration of both soil and water sciences. Students may choose complementary classes in the **Soil Emphasis, Water Emphasis, or Plant Emphasis** in preparation for a variety of career opportunities. The Environmental Soil/Water Science Major is complementary to existing undergraduate programs at Utah State University in Geology, Environmental Studies, Watershed and Earth Systems, and Environmental Engineering.

Career Opportunities

A growing number of diverse and exciting career opportunities exist for students with a BS degree in Environmental Soil/Water Science. The targeted job market is environmental consulting, regulatory, and service agencies. Depending upon the student's interests and area of emphasis within the major, potential positions include: (1) Federal agency soil conservationists or soil scientists (Natural Resource Conservation Service, Forest Service, Bureau of Land Management, Bureau of Reclamation, etc.); (2) environmental consulting or regulatory specialists (private environmental consulting firms, Environmental Protection Agency, state regulatory agencies, etc.) in: soil-plant-water-atmosphere relations (irrigation, biometeorology); site analysis (soil and sediment mapping and stratigraphy, classification, interpretation, sampling, preparation of environmental impact statements); soil quality (soil conservation, erosion, fertility, mine-land soil reconstruction, contaminated soil amelioration); water quality (water chemistry and analysis); and waste management (fate, analysis, transport, and transformation of agricultural and environmental pollutants in the soil-water zone).

Students completing this degree will also be prepared to enter graduate research and education programs in a variety of related disciplines. The Department of Plants, Soils, and Climate offers related MS and PhD degrees in Soil Science, Biometeorology, and Ecology.

Degrees and Programs Offered Through This Department

Bachelor of Science (BS):

- Crop Science
- Horticulture
- Environmental Soil/Water Science

Master of Science (MS) and Doctor of Philosophy (PhD):

- Plant Science
- Soil Science
- Biometeorology
- Ecology

Master of Professional Studies in Horticulture (MPSH)

Associate of Applied Science (AAS) and One-year Certificate:

- Ornamental Horticulture

Graduation Requirements: BS Degree in Environmental Soil/Water Science

Minimum University Requirements*

Total credits	120
Grade point average (most majors require higher GPA)	2.00 GPA
Credits of C- or better	100
Credits of upper-division courses (#3000 or above)	40
USU credits	30
(20 of which must be upper division, including 10 required by major)	
Completion of approved major program of study	See department
Credits in minor (if required by department)	12
Credits in American Institutions (ECON 1500; HIST 1700, 2700, or 2710; POLS 1100; or USU 1300)	3
University Studies requirements	See next page

*Colleges and departments may require more credits or a higher GPA. See requirements on this sheet.

University Studies Requirements for Environmental Soil/Water Science Major

Note: Approved University Studies courses and requirements are listed in the back section of each semester's *Schedule of Classes*.

General Education Requirements (30-34 credits)

Competency Requirements (9-10 credits)

Communications Literacy (CL1 and CL2) (6 credits)

ENGL 1010 (CL1) (3 credits) or satisfactory AP, CLEP, IBO, ACT, or SAT score

AND

ENGL 2010 (CL2) (3 credits) or satisfactory IBO score

Quantitative Literacy (QL) (3-4 credits)

MATH 1030 or 1050 or STAT 1040 (3-4 credits)

OR

One MATH or STAT course requiring MATH 1050 as a prerequisite

OR

Satisfactory AP, CLEP, IBO, ACT, or SAT score

Computer and Information Literacy (0 credits)

Passing grade on six computer and information literacy related examinations.

Breadth Requirements (18-20 credits)

Select at least one approved course from each of the following six categories: **American Institutions (BAI)**, **Creative Arts (BCA)**, **Humanities (BHU)**, **Life Sciences (BLS)**, **Physical Sciences (BPS)**, and **Social Sciences (BSS)**. At least two of the six breadth courses must be University Studies courses with a **USU prefix** (excluding USU 1000, 1010, 1100, 3330, 4900, and 6900). (CLEP or AP credit may be used.) GEO 1110, CHEM 1110, 1120, 1220, or PHYS 2120 will fulfill the Physical Sciences requirement for students in the Environmental Soil/Water Science major.

Exploration Requirement (3-4 credits)

Choose an additional class from one of the following General Education categories: QL, BAI, BCA, BHU, BLS, BPS, or BSS.

Depth Education Requirements

Communications Intensive (CI) (2 courses)

PSC 3890 and 4890 will meet this requirement.

Quantitative Intensive (QI) (1 course)

STAT 2000 or 3000 will meet this requirement.

Depth Course Requirements (4 credits minimum, including 2 credits minimum completed in each of two courses)

Complete at least 2 credits in *approved* 3000-level or above courses from each of the following two categories: **Humanities and Creative Arts (DHA)** and **Social Sciences (DSS)**.

Department Requirements

All courses used to fulfill major requirements must be taken for a grade of *A-B-C-D-F* and not *Pass/Fail*. A 2.5 GPA is required for all courses used to fulfill major requirements (i.e., Preparatory Core, Professional Core, and Emphasis courses). At least 12 credits of the major must be taken in residence.

ARCPACS Certification

For general information, students should refer to the American Society of Agronomy website at: <https://www.agronomy.org/> and the ARCPACS website at: <https://www.agronomy.org/certifications/>

For specific course requirements, students should contact their advisor in the Plants, Soils, and Climate Department.

Environmental Soil/Water Science Major

Note: Effective Summer Semester 2006, some course numbers changed, due to House Bill 320 (Common Course Numbering). Course numbers used *prior to* Summer Semester 2006 are shown in parentheses, following *formerly*.

Preparatory Core Courses (43-49 credits)

Required Courses (18 credits)

Credits

- BIOL 1610** Biology I (F). 4
(formerly **BIOL 1210**)
- BIOL 1620 (BLS)** Biology II (Sp). 4
(formerly **BIOL 1220**)
- GEO 1110 (BPS)** The Dynamic Earth: Physical Geology (F,Sp) 4
(formerly **GEO 1150**)
- STAT 2000 (QI)** Statistical Methods (F,Sp) (3 cr) **or**
- STAT 3000 (QI)** Statistics for Scientists (F,Sp,Su) (3 cr). 3
- WILD 2200 (BLS)** Ecology of Our Changing World (F,Sp) (3 cr) **or**
- BIOL 2220** General Ecology (F,Sp) (3 cr). 3

Chemistry Courses (9 or 13 credits)

Complete *one* of the two following blocks of Chemistry courses:

Block 1 (9 credits)

- CHEM 1110 (BPS)** General Chemistry I (F,Sp) 4
- CHEM 1115** General Chemistry Laboratory (F,Sp). 1
(formerly **CHEM 1130**)
- CHEM 1120 (BPS)** General Chemistry II (Sp) 4

Block 2 (13 credits)¹

- CHEM 1210** Principles of Chemistry I (F,Sp). 4
- CHEM 1215** Chemical Principles Laboratory I (F,Sp) 1
(formerly **CHEM 1230**)
- CHEM 1220 (BPS)** Principles of Chemistry II (F,Sp,Su). 4
- CHEM 1225** Chemical Principles Laboratory II (F,Sp). 1
(formerly **CHEM 1240**)
- CHEM 2300** Principles of Organic Chemistry (F) 3

Mathematics Courses (10 or 8 credits)

Complete *one* of the two following blocks of Mathematics courses:

Block 1 (10 credits)

- MATH 1050 (QL)** College Algebra (F,Sp,Su) 4
- MATH 1060** Trigonometry (F,Sp,Su) 2
- MATH 1210 (QL)** Calculus I (F,Sp,Su). 4

Block 2 (8 credits)¹

- MATH 1210 (QL)** Calculus I (F,Sp,Su). 4
- MATH 1220 (QL)** Calculus II (F,Sp,Su) 4

Physics Courses (8 credits)

Complete *one* of the two following blocks of Physics courses:

Block 1 (8 credits)

- PHYS 2110** The Physics of Living Systems I 4
- PHYS 2120 (BPS)** The Physics of Living Systems II. 4

Block 2 (8 credits)¹

- PHYS 2210 (QI)** General Physics—Science and Engineering I. 4
- PHYS 2220 (BPS/QI)** General Physics—Science and Engineering II 4

Professional Core Courses (23 credits)

- SOIL 3000** Fundamentals of Soil Science (F) 4
- SOIL 5050** Principles of Environmental Soil Chemistry (Sp odd) 3
- SOIL 5130** Soil Genesis, Morphology, and Classification (F) 4
- SOIL 5310** Soil Microbiology (F even) (3 cr) **or**
- SOIL 5550 (QI)²** Soils and Plant Nutrient Bioavailability (Sp) (3 cr) 3
- SOIL 5560** Analytical Techniques for the Soil Environment (Sp) 2
- SOIL 5650** Environmental Soil Physics (F) 3
- SOIL 5750** Environmental Quality: Soil and Water (Sp) 2
- PSC 3890 (CI)** Preparation for Careers in Plants, Soils, and/or Climate (F) 1
- PSC 4890 (CI)** Senior Seminar (Sp). 1

¹Students in the **Water Emphasis** should take the **Block 2** courses in Chemistry, Mathematics, and Physics.

²Students in the **Plant Emphasis** must select **SOIL 5550**.

Emphases

Students must select 12 credits from one or a combination of the following three emphases.

Soil Emphasis

	Credits
<input type="checkbox"/> CEE 5190 Geographic Information Systems for Civil Engineers (Sp)	3
<input type="checkbox"/> CHEM 3000 (QI) Quantitative Analysis (F) (formerly CHEM 3600)	3
<input type="checkbox"/> CLIM/BIE/WATS 5250 Remote Sensing of Land Surfaces (Sp)	4
<input type="checkbox"/> GEO 3500 Mineralogy and Crystallography (F)	4
<input type="checkbox"/> GEO 3550 (CI) Sedimentation and Stratigraphy (F)	4
<input type="checkbox"/> GEO/WATS 3600 Geomorphology (F)	4
<input type="checkbox"/> GEO 5410 ³ Introduction to Clay Mineralogy (Sp)	2
<input type="checkbox"/> GEO 5600 Geochemistry (F)	3
<input type="checkbox"/> GEO 5630 Photogeology (Sp)	3
<input type="checkbox"/> PSC 5200 Site-Specific Agriculture and Landscape/Horticultural Management (Sp, half semester)	3
<input type="checkbox"/> SOIL 3100 Soils and Civilization (Sp)	3
<input type="checkbox"/> SOIL 3200 (DSC) Microbes in Environmental Action (Sp)	3
<input type="checkbox"/> SOIL 4000 Soil and Water Conservation (F)	4
<input type="checkbox"/> SOIL 4500 Soil Reclamation (Sp)	3
<input type="checkbox"/> SOIL 5310 Soil Microbiology (F even)	3
<input type="checkbox"/> SOIL 5320 Soil Microbiology Laboratory (F even)	2
<input type="checkbox"/> SOIL 5350 Wildland Soils (Sp)	3
<input type="checkbox"/> SOIL 5550 (QI) Soils and Plant Nutrient Bioavailability (Sp)	3
<input type="checkbox"/> WATS 4750 ³ Fundamentals of Remote Sensing Science (F)	3
<input type="checkbox"/> WATS 4930 Geographic Information Systems (F)	4
<input type="checkbox"/> WATS 5930 Geographic Information Analysis (Sp)	3
<input type="checkbox"/> WILD 5750 Applied Remote Sensing (F)	3

Water Emphasis

<input type="checkbox"/> ASTE 5260 (CI) Environmental Impacts of Agricultural Systems (F)	3
<input type="checkbox"/> BIE 5010 ³ Principles of Irrigation Engineering (F, Sp online, Su)	3
<input type="checkbox"/> BIE 5110 ³ Sprinkle and Trickle Irrigation (F)	4
<input type="checkbox"/> BIE 5150 ³ Surface Irrigation Design (F, Sp online, Su)	3
<input type="checkbox"/> CEE 3430 Engineering Hydrology (Sp)	3
<input type="checkbox"/> CHEM 3000 (QI) Quantitative Analysis (F) (formerly CHEM 3600)	3
<input type="checkbox"/> CLIM 4300 General Meteorology (F)	3
<input type="checkbox"/> CLIM/BIE/WATS 5250 Remote Sensing of Land Surfaces (Sp)	4
<input type="checkbox"/> CLIM 5500 Land-Atmosphere Interactions (Sp odd)	3
<input type="checkbox"/> GEO/WATS 5150 ³ Fluvial Geomorphology (F)	3
<input type="checkbox"/> GEO 5510 (QI) Groundwater Geology (F)	3
<input type="checkbox"/> GEO 5520 (CI) ³ Techniques of Groundwater Investigations (Sp)	3
<input type="checkbox"/> PLSC 5200 Environmental Plant Physiology (Sp)	2
<input type="checkbox"/> PLSC 5210 Environmental Plant Physiology Laboratory (Sp)	1
<input type="checkbox"/> SOIL 4000 Soil and Water Conservation (F)	4
<input type="checkbox"/> SOIL 4700 Irrigated Soils (Sp, half semester)	3
<input type="checkbox"/> WATS 3700 (CI) Fundamentals of Watershed Science (Sp)	3
<input type="checkbox"/> WATS 4500 Limnology: Ecology of Inland Waters (Sp)	3
<input type="checkbox"/> WATS 4510 Aquatic Ecology Practicum (F)	3
<input type="checkbox"/> WATS 4530 Water Quality and Pollution (F)	3
<input type="checkbox"/> WATS 5640 ³ Riparian Ecology and Management (Sp)	3

Plant Emphasis

Credits

<input type="checkbox"/> BIOL 2410 Plants and Fungi in the Field (Su)	2
<input type="checkbox"/> BIOL 4400 (QI) Plant Physiology (F)	4
<input type="checkbox"/> BIOL 4410 Plant Structure (Sp)	3
<input type="checkbox"/> BIOL 4420 Plant Taxonomy (Sp)	3
<input type="checkbox"/> CLIM 5500 Land-Atmosphere Interactions (Sp odd)	3
<input type="checkbox"/> PLSC 2100 (BLS) Introduction to Horticulture (F)	3
<input type="checkbox"/> PLSC 2600 Annual and Perennial Plant Materials (F, half semester)	1.5
<input type="checkbox"/> PLSC 2620 Woody Plant Materials: Trees and Shrubs for the Landscape (F)	3
<input type="checkbox"/> PLSC 3400 Landscape Management Principles and Practices (Sp)	3
<input type="checkbox"/> PLSC 3800 Turfgrass Management (F)	3
<input type="checkbox"/> PLSC 4280 Field Crops (F)	3
<input type="checkbox"/> PLSC 4320 Forage Production and Pasture Ecology (F)	3
<input type="checkbox"/> PLSC 4400 Modern Vegetable Production (F)	3
<input type="checkbox"/> PLSC 4500 Fruit Production (Sp even)	3
<input type="checkbox"/> PLSC 4800 ³ Professional Turfgrass Management (Sp)	2
<input type="checkbox"/> PLSC 5200 ³ Environmental Plant Physiology (Sp)	2
<input type="checkbox"/> PLSC 5210 ³ Environmental Plant Physiology Laboratory (Sp)	1
<input type="checkbox"/> PLSC 5430 ³ Plant Nutrition (F odd)	2
<input type="checkbox"/> PLSC 5550 Weed Biology and Control (F)	4
<input type="checkbox"/> PLSC 5760 ³ Crop Ecology (Sp)	2
<input type="checkbox"/> PSC 2800 Fundamentals of Organic Agriculture (Sp)	3
<input type="checkbox"/> SOIL 4700 Irrigated Soils (Sp, half semester)	3
<input type="checkbox"/> WILD 3600 Wildland Plant Ecology and Identification (F)	4
<input type="checkbox"/> WILD 4750 (CI) Monitoring and Assessment in Natural Resource and Environmental Management (F)	3
<input type="checkbox"/> WILD 4910 Assessment and Synthesis in Natural Resource Science (Sp)	3

³Prerequisites are required for this course.

Requirement Changes

Graduation requirements shown on this sheet are subject to change. Students should check with their departments concerning possible changes.

Materials for Persons with Disabilities

This requirement sheet is available in digital format, recordings, or large print upon request to the USU Disability Resource Center.

For information contact

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