

# **Bachelor of Science in Environmental Science**

**-- Guidelines for Majors --**

**Department of Soil, Water and Environmental  
Science  
The University of Arizona**

**2010-2011**

**BACHELOR OF ENVIRONMENTAL SCIENCE DEGREE**

Shantz Building Room 429  
520-621-1646  
[www.aq.arizona.edu/swes](http://www.aq.arizona.edu/swes)

**REVISED Aug 2010**

## **INTRODUCTION**

Environmental science is the scientific investigation of human interactions with natural systems. The goals of the Bachelor of Environmental Science Degree are to:

- 1) Offer a rigorous science-based preparation for careers in environmental science;
- 2) Prepare students for graduate studies in environmental science;
- 3) Facilitate assuming a leadership role in academia, business, government, private organizations, or other career venues.
- 4) Provide the academic tools needed to address fundamental and applied problems related to human-inhabited parts of the Earth.

With this degree, students will be well-prepared for careers in private and government agencies, educational institutions, and private consulting firms. Some titles associated with these jobs include: Environmental Scientist, Environmental Engineer, Industrial Hygienist, Environmental Health Specialist, Earth Scientist, Ecologist, Forester, Environmental Chemist, Environmental Microbiologist, Meteorologist, Soil Scientist, Environmental Lawyer, and Natural Resources Manager. Students will also be prepared for an advanced degree in a variety of fields, such as environmental health, resource management, engineering, law, and public policy.

## **COURSEWORK**

The Bachelor of Environmental Science Degree comprises general education, core, and focal area classes typically taken over eight semesters. A suggested course sequence is listed at the end of this brochure.

**Note: Some classes have prerequisite requirements; it is important to check the U of A online Schedule of Classes (<http://garnet.ccit.arizona.edu/cgi-bin/schedule/schedule.cgi>) to confirm course availability and class prerequisites.**

### Units:

122	Total for Bachelor's Degree (42 upper division)
35	General Education
69	Major Core Classes (24 upper division)
18	Focal Area Classes (18 upper division)

**A. General Education.** These classes give undergraduates a diverse academic background to complement each major.

<b><u>Foundation Courses</u></b> English Composition Mathematics (satisfied by MATH 124/125)	6 Units	<b><u>Tier 1</u></b> Traditions and Cultures Individuals and Societies	6 Units 6 Units
<b><u>Pre-Major</u></b> Communications (satisfied by SWES 408)		<b><u>Tier 2</u></b> Humanities Arts Individuals and Societies	3 Units 3 Units 3 Units
<b><u>Second Language</u></b> Second semester proficiency	variable		

## B. General Science Core (32 Units)

Courses	Units	Fall	Spring
CHEM 151, 152, Intro Chem I & II	8	X	X
CHEM 241A, & 243A Organic Chem	4	X	X
MATH 124 Calculus	5	X	X
MATH 263 Statistics	3	X	X
MCB 181R/L Intro Biol	4	X	X
MIC 205A/L Intro Microbiol	4	X	X
PHYS 141 Physics	4	X	X

## C. Environmental Science Core (37 units, 24 upper division units)

Courses	Units	Fall	Spring
GEOS 251 Physical Geology	4	X	X
SWES 195A Careers Env Sci	1	X	X
SWES 200/201 Intro Soils	4	X	X
SWES 210 Fund Env Sci & Sustainability	3	X	X
SWES 305 Pollution Science	3		X
SWES 408 Technical Writing	3		X
OR SWES 415 Translating Env Sci			X
SWES 418 Human Health Risk Assessment	3		X
SWES 420 Env Physics	3	X	
SWES 425 Env Microbiology	3	X	
OR SWES 474 (3) Aquatic Plants & The Environment		X	
OR SWES 475 (3) Freshwater & Marine Algae			X
SWES 430 Env Monitor/Remed. (Capstone)	4		X
SWES 462 Env Soil & Water Chem	3		X
SWES 393/493 Internship	3	X	X
OR SWES 399/499 Indep Study			
OR SWES 397A Teaching Workshop			

## Prerequisite Coursework

Core Class	Prerequisite Courses
CHEM 151	MATH 112 or MATH 120
CHEM 152	CHEM 151
CHEM 241A/243A	CHEM 152
MATH 124	MATH 112 & MATH 111, or MATH 120R
MATH 263	MATH 112
MCB 181R/L	MATH 112 or MATH 120
MIC 205A/L	CHEM 151, MCB 181R
PHYS 141	MATH 124
SWES 200	CHEM 151
SWES 305	CHEM 241A, MATH 124, MIC 205A, PHYS 141
SWES 415	ENGL 102 (A or B grade), any MATH class
SWES 420	MATH 124 or MATH 125, PHYS 141
SWES 425	MIC 205A
SWES 430R/L	SWES 305
SWES 462	SWES 200, CHEM 152

## D. Environmental Science Focal Area Coursework.

Students may pursue one of the following.

### 1. Biology Focus

This focus centers on the influence of the environment on living organisms, populations, communities, landscapes, and vice versa. It emphasizes agricultural and aquacultural impacts on the environment, use of plants to clean up the environment (phytoremediation), and management of freshwater and marine systems.

Advisor: Dr. Kevin Fitzsimmons, 626-3324, [kevfitz@ag.arizona.edu](mailto:kevfitz@ag.arizona.edu)

(18 units upper division)

<p><b>Select two (8 units)</b>          ECOL 335 Evolutionary Biology (4) II          ECOL 406R/L Conservation Biology (4)          ECOL 320 Genetics (4)</p>	<p><b>Options (6 units)</b>          ECOL 310 Living in Symbiosis (3) I          ECOL 380 Mathematic Models in Biology (3) I          RNR 316 Natural Resources Ecology (3) I          RNR 384 Natural Resource Management (3) II          RNR 355 Intro to Wildland Fire (3) I          RNR 403 Applied Geog Information Systems (3) I,II          SWES 316 Soil Fertility/Plant Nutrition (3) II          SWES 425 Environmental Microbiology (3) I          SWES 431 Soil Genesis, Morph/Taxon (3) I          SWES 453 Remote Sensing of the Env (3) I          SWES 456A Watersheds &amp; Ecosys Function (3) II          SWES 475 Freshwater &amp; Marine Algae (4) II</p>
<p><b>Select one (4 units)</b>          ECOL 404R/L Biology of the Oceans (4)          ECOL 441 Limnology (4)          GEOS 412 Ocean Sciences (4)          SWES 474 Aquatic Plants in the Environment (4)</p>	

Students must complete following prerequisite:

ECOL 182 Intro. to Biology II R/L (4)

### 2. Soil Science Focus

This focus emphasizes the properties and uses of soils, their classification, management, and conservation as important natural resources. This focal area qualifies students to be soil scientists or soil conservationists in U.S. Government agencies (i.e. Natural Resources Conservation Service or Forest Service). **NOTE:** Students can become certified as a **Certified Professional Soil Scientist** with the Soil Science Society of America. The Council of Soil Science Examiners (CSSE) offers exams in October and March each year. The following classes help prepare for the exam: SWES200/201, SWES316, SWES462, and SWES470.

Advisors: Dr. Craig Rasmussen, 621-7223, [crasmuss@ag.arizona.edu](mailto:crasmuss@ag.arizona.edu)

Dr. Thomas Wilson, 621-9308, [twilson@ag.arizona.edu](mailto:twilson@ag.arizona.edu)

(18 units upper division)

<p><b>Required Courses (12 units)</b>          SWES 316 Soil Fertility/Plant Nutrition (3) II          SWES 401 Mgt Arid /Salt Soils (3) II (even yrs)          SWES 431 Soil Genesis, Morph/Taxon (3) I          SWES 470 Soil Physics (3) II</p>	<p><b>Options (6 units)</b>          GEOS 478 Global Change (3), I          RNR 403 Appl Geog Info Sys (3), I          RNR 417 GIS for Natural &amp; Social Sci (3), I          SWES 330 Intro to Remote Sensing (3), I          SWES 453 Remote Sensing of the Env (3), I          SWES 461 Soil/Water Cons (3) Pre-session/odd yrs          GEOS 450 - Geomorphology (Fall 4 units)          GEOS 453 - Glacial &amp; Quaternary Geol (3) II          SWES 456A - Watershed &amp; Ecosys Function (3) II          WSM 473 - Spatial Analysis &amp; Modeling (3) I          SWES 425 - Environmental Microbiology (3) I          SWES 426 Env. Micro. Lab (2) I</p>
--	--

### 3. Pollution Science Focus

This focus was developed with the Chemical and Environmental Engineering Department. It prepares students to deal with environmental pollution and to solve complex environmental problems requiring an interdisciplinary background.

Advisor: Dr. Mark L. Brusseau, 621-3244, [brusseau@ag.arizona.edu](mailto:brusseau@ag.arizona.edu)

(18 Units upper division)

<b>Required courses (6 units)</b> SWES 464 Environmental Chemistry (3) I CHEM 480a Physical Chemistry (3) I, II	<b>Options (6 units)</b> ATMO 469A Air Pollution I: Gases (3) I ATMO 469B Air Pollution II, (3) II (odd years) CHEE 400R Water Chemistry (3) I CHEE 400L Water Chemistry (1) I SWES 425 Environmental Microbiology (3) I SWES 440 Biodegradation (3) II (even years) SWES 453 Remote Sensing of the Environment (3) I CHEE 478 (CE 478) Intro Hazardous Waste (3) I, II CHEE 370R Env & Water Engineering (3), I, II CHEE 370L Env & Water Engineering (1) I, II
<b>Select one (3-4 units)</b> SWES 470 Soil Physics (3) II HWR 431 Hydrogeology (4) I	
<b>Select one (3 units)</b> HWR 423 Hydrology (3) I WSM 460 Watershed Hydrology (3) I	

Students must complete following prerequisites:

MATH 129 Calculus II (3) I, II

PHYS 103 Intro Physics II (3) I, II, Sum, or PHYS 241 Intro Electricity & Mag (4) I, II, Sum

### 4. Chemistry Focus

This focus integrates physical and chemical sciences within a quantitative framework applied to the environment. It includes the study of sources, reactions, transport, effects and fates of chemical species in water, soil, air, and living environments.

Advisors: Dr. Joan Curry, 626-5081, [curry@ag.arizona.edu](mailto:curry@ag.arizona.edu)

Dr. Jon Chorover, 626-5635, [chorover@ag.arizona.edu](mailto:chorover@ag.arizona.edu)

(18 units upper division)

<b>Required Courses (9 units)</b> CHEM 322 Principles of Analysis I (2) II, Sum CHEM 323 Principles of Analysis I Lab (1) II CHEM 480A Physical Chemistry (3) I, II SWES 464 Environ Chemistry (3) I	<b>Options (9 units)</b> ATMO 696A Air Pollution I: Gases (3) I ATMO 696B Air Pollution II (3) II, (odd yrs) CHEM 404 Inorganic Chem (3) I CHEE 400R Water Chem for Engr (3) I CHEE 400L Water Chem for Engr (Lab) (1) I,II CHEE 478 Intro to Hazardous Waste Mgmt (3) II GEOS 400 Intro to Geochemistry (3) I MSE 412 Physical Chemistry of Materials (3) I PTY5 407 Chemistry of the Solar System (3) I SWES 401 Mgt Arid Land/Salt Soils (3) II (even years) SWES 431 Soil Genesis, Morph/Taxon (3) I
--	---

Students must complete following prerequisites:

MATH 129 Calculus II (3) I,II

PHYS 103 Intro Physics II (3) I, II, Sum, or PHYS 241 Intro Electricity & Mag (4) I, II, Sum

## 5. Sustainable Land/Water Management

This focuses on landscape-level processes in environmental science. It investigates human-caused deforestation and desertification, ecological restoration; water, soil and air pollution, and global change.

Advisors: Dr. Edward P. Glenn, 626-2664, [eglenn@ag.arizona.edu](mailto:eglenn@ag.arizona.edu)  
 Dr. Allan D. Matthias, 621-7226, [matthias@ag.arizona.edu](mailto:matthias@ag.arizona.edu)  
 Dr. James J. Riley, 591-4019, [jjriley@ag.arizona.edu](mailto:jjriley@ag.arizona.edu)

(18 units upper division)

<p><b>Required course (3 units)</b>          SWES 444 Applied Environ Law (3) I</p>	<p><b>Options (6 units)</b>          ECOL 406 R/L Conservation Biology (4) I          GEOG 304 Water, Environ, &amp; Society (3) I, II, Sum          GEOG 397A Field Study in Geog (1) I, II, Sum          GEOG 461 Env &amp; Resource Geography (3) II          GEOS 450 Geomorphology (4) I          GEOS 478 Global Change (3) I</p>
<p><b>Select one (3 units)</b>          RNR 403 Appl Geog Info Sys (3) I,II          SWES 453 Remote Sensing of the Environ (3) I</p>	<p>RNR 403 Appl Geog Info Sys (3) I,II          SWES 316 Soil Fertility/Plant Nutrition (3) II          SWES 401 Mgt Arid Land/Salt Soils (3) II (even yrs)          SWES 425 Env Microbiol (3) I          SWES 426 Env Microbiol Lab (2) I</p>
<p><b>Select one (3 units)</b>          SWES 454 Water Harvesting (3) II          SWES 461 Soil/Water Cons (3) Pre (odd yrs)          WSM 460 Watershed Hydrology (3) I</p>	<p>SWES 431 Soil Genesis, Morph &amp; Taxon (3) I          SWES 453 Remote Sensing of the Environ (3) I          SWES 454 Water Harvesting (3) II          SWES 456A Watersheds &amp; Ecosys Function (3) II          SWES 461 Soil/Water Conserv (3) Pre-session (odd yrs)          SWES 470 Soil Physics (3) II          SWES 474 Aquatic Plants &amp; the Environment (4) I</p>
<p><b>Select one (3 units)</b>          SWES 401 Mgt Arid Salt Soils (3) II (even yrs)          SWES 431 Soil Gen, Morph &amp; Taxon (3) I</p>	<p>SWES 475 Fresh Water &amp; Marine Algae (4) II</p>

## 6. Microbiology Focus

This focus primarily addresses issues such as the remediation of contaminated sites and natural processes of decomposition, as well as water and food quality (pathogens).

Advisors: Dr. Raina Maier, 621-7231, [rmaier@ag.arizona.edu](mailto:rmaier@ag.arizona.edu)  
 Dr. Ian Pepper, 626-3328, [ipecpper@ag.arizona.edu](mailto:ipecpper@ag.arizona.edu)  
 Dr. Christopher Rensing, 626-8482, [rensingc@ag.arizona.edu](mailto:rensingc@ag.arizona.edu)

(18 Units upper division)

<p><b>Required Courses (5 units)</b>          SWES 425 Environmental Microbiology (3) I          SWES 426 Env. Micro. Lab (2) I</p>	<p><b>Options (9 units)</b>          BIOC 462a Biochemistry (4-5) I          BIOC 460 Gen Prot &amp; Gen Metab Biochem (3) I, II, SUM          ECOL 320 Genetics (4) I, II          MCB 411 Molecular Biology (3-4) I, II          MCB 473 Recomb DNA Methods/Appl (4) I, II          MIC 328R Microbial Physiology (3) II          MIC 421b Microbiological Techniques (3) II          SWES 440 Biodeg of Pollutants (3) II (even years)          SWES 475 Freshwater and Marine Algae (4) II          WFSC 441 Limnology (4) I</p>
<p><b>Select one (4 units)</b>          BIOC 462a Biochemistry (4) I          ECOL 320 Genetics (4) I, II</p>	

Students must complete following prerequisites:

CHEM 241b Organic Chemistry (3) I, II (for BIOC & MIC courses)

ECOL 182 Intro. to Biol 2 (3), I, II (for ECOL & MCB courses)

## 7. Science and Policy Focus (24 Units):

This focus emphasizes environmental science policy issues. It includes courses in a variety of disciplines, from public policy to ecology. This focal area is ideally suited for Pre-Law students.

Advisors: Dr. Robert G. Varady, 884-4393, [rvarady@u.arizona.edu](mailto:rvarady@u.arizona.edu)  
 Dr. Edella Schlager, 621-5840, [eschlager@bpa.arizona.edu](mailto:eschlager@bpa.arizona.edu)

(18 units upper division)

<p><b><u>Required Courses (9 units)</u></b>          AREC 476 Env Law/Econ (3) II          SWES 444 Applied Environ Law (3) I          PHIL 323 Env Ethics (3), I,II, SUM</p>	<p><b><u>Option (3 units)</u></b>          ANTH 307 Ecol Anthro (3) II          ANTH 424A Political Ecology (3) I          AREC 375 Land/Water in the American West (3) II          AREC 377 Econ of Env Resource Conserv (3) II          AREC 464 Econ of Policy Analysis (3), I          AREC 479 Econ of Water Management/Policy (3) II          ATMO 336 Weather, Climate, and Society (3) I,II          COMM 411 Comm/Conflict Management (3) I,II          ECOL 406 R/L Conserv Biol (4) I          ENGL 306 Advanced Composition (3) I,II          GEOG 461 Env &amp; Resource Geography (3) II          HIST 355 U.S. Env Hist (3) I,II          HIST 356 Global Env Hist (3) I,II          PA 406 Bureaucracy, Politics, &amp; Policy (3) I          PA 461 Global Climate Change Policy (3) I,II          PA 480 Formation of Public Policy (3) II          PA 481 Env Policy (3) I          PSYC 374 Env Psych (3) I          RNR 480 Nat Resource Policy/Law (3) II          RNR 485 Nat Resource /Econ &amp; Planning (4) I          SOC 313 Collective Behavior/Social Movements (3) I, II          MN E 422 Engineering Sustainable Development (3) I</p>
<p><b><u>Select one (3 units)</u></b>          PA 481 Env Pol (3) I          RNR 480 Nat Resource Policy/Law (3) II</p>	
<p><b><u>Select one (3 units)</u></b>          HIST 355 U.S. Env History (3) II          HIST 356 Global Env History (3) I,II</p>	

Students must complete following prerequisite:

POL 201 American Nat Gov (3) I,II (Tier II INDV)

## 8. Remote Sensing and Geospatial Analysis

This focal area applies principles of remote sensing and geographic information systems analysis tools and their applications to the study of the environment and global change

Advisors: Dr Alfredo Huete, 621-3228, [ahuete@ag.arizona.edu](mailto:ahuete@ag.arizona.edu)  
 Dr. Phil Guertin, 621-1723, [phil@nexus.snr.arizona.edu](mailto:phil@nexus.snr.arizona.edu)

(18 Units upper division)

<p><b><u>Required Courses (6 units)</u></b>          RNR 417 Geog Info Sys Nat Resources (3) I          SWES 330 Intro Remote Sensing (3) I</p>	<p><b><u>Options (6 units)</u></b>          GEOG 303 Field Studies of Env Geography (3) I, II, SUM          GEOG 357 Geog Research Methods (3) I, II          GEOG 416A Computer Cartography (3) I          GEOS 478 Global Change (3) I          OPTI 531 Image Processing Lab (3) I          OPTI 550 Fundamentals of Remote Sensing (3) II          RNR 271 Nat Resource Computer Appl (3) II          RNR 321 Nat Resource Measurements (3) II          RNR 473 Spatial Analysis/Modeling (3) I          SWES 431 Soil Genesis, Morph/Taxon (3) I          SWES 461 Soil/Water Cons (3) PreSession (odd yrs)          SWES 470 Soil Physics (3) II</p>
<p><b><u>Select two (6 units)</u></b>          RNR 419 Carto Model for Nat Resources (3) II          RNR 420 Advanced Geog Info Sys (3) II          SWES 453 Remote Sensing Environment (3) I          SWES 483 Geog Appl Remote Sensing (3) II          SWES 490 Remote Sensing Planet Earth (3) II</p>	

## 9. Communication & Education

This focal area trains students to bridge the communication gap between the applications and nomenclature of cutting-edge environmental technology and the perceptions of the lay public.

Advisors: Dr. Melanie Lenart 792-8736 [melenart@email.arizona.edu](mailto:melenart@email.arizona.edu)  
 Dr. Tom Wilson 621-9308 [twilson@ag.arizona.edu](mailto:twilson@ag.arizona.edu)

(18 Units upper division)

<p><b><u>Required Courses (9 units)</u></b>          A ED 422 Comm Knowledge in Ag &amp; Life Sci (3) I          PHIL 323 Environmental Ethics (3) I, II, SUM          PSYC 374 Environmental Psychology (3)</p>	<p><b><u>Options (3 units)</u></b>          AREC 476 Env Law &amp; Economics (3) II          ED P 310 Learning in the Schools (3) I, II          ED P 340 Research in Education (3) I, II          GEOG 461 Env &amp; Resource Geog (3) II          GEOS 478 Global Change (3) I          STCH 250 Teaching Science (3) I, II          SWES 444 Applied Env Law (3) I          TTE 350 Schooling in America (3) I, II, SUM</p>
<p><b><u>Select one (3 units)</u></b>          SWES 408 Technical Writing (3) II          SWES 415 Translating Env Science (3) II</p>	
<p><b><u>Select one (3 units)</u></b>          GEOS 220 Env History of Southwest (3) I          HIST 355 US Environmental History (3) II          HIST 356 Global Environmental History (3) II</p>	

### E. SWES Minors. Students must complete following prerequisites:

MATH 112 College Algebra (3) II  
 CHEM 151 Intro Chem I (3) I, II, Sum

### *Environmental Science Minor (20 units)*

<p><b><u>GENERAL SCIENCE COURSES (14 units)</u></b>          MCB 181R Intro Biol (3) I          SWES 195A Careers in Env Sci (1) I, II          SWES 200 Soils (3) I, II          SWES 201, Soils Lab (1) I, II          SWES 210 Fund. Env. Sci &amp; Sustain (3) I, II          WSM 460 Watershed Hydrology (3) I</p>	<p><b><u>UPPER DIVISION COURSES (6 units)</u></b>          Select from AREC, ATMOS, HIST, HWR, POL, RNR, SWES or other relevant courses.</p>
---	--

### *Soil and Water Science Minor (20 units)*

<p><b><u>GENERAL SCIENCE COURSES (11 units)</u></b>          GEOS 251 Physical Geology (4) I, II          SWES 200 Soils (3) I, II          SWES 201 Soils lab (1) I, II          WSM 460 Watershed Hydrology (3) I</p>	<p><b><u>UPPER DIVISION COURSES (9 units)</u></b>          SWES 316 Soil Fertility/Plant Nutrition (3), II          SWES 401 Mgt Arid Land/Salt Soils (3), II (even years)          SWES 431 Soil Genesis, Morph/Taxon (3), I          SWES 461 Soil/Water Cons (3) Pre-session/odd yrs</p>
---	---



## Environmental Science Major Schedule Planning Worksheet

FIRST SEMESTER (Fall)				SECOND SEMESTER (Spring)			
Recommended		Your Schedule		Recommended		Your Schedule	
CHEM 151	4			CHEM 152	4		
ENGLISH 101	3			ENGLISH 102	3		
SWES 195A	1			SWES 200	3		
SWES 210	3			SWES 201	1		
Tier I course	3			Tier I Course	3		
SWES 195A	1			1 <sup>st</sup> Year Colloquia	1		
<b>TOTAL</b>	<b>15</b>	<b>TOTAL</b>		<b>TOTAL</b>	<b>15</b>	<b>TOTAL</b>	

THIRD SEMESTER (Fall)				FOURTH SEMESTER (Spring)			
Recommended		Your Schedule		Recommended		Your Schedule	
Tier I course	3			Tier I course	3		
MCB 181 R/L	4			PHYS 141	4		
CHEM 241a	3			GEOS 251	4		
CHEM 243a	1			Focal Area Class	3		
MATH 124	5						
<b>TOTAL</b>	<b>16</b>	<b>TOTAL</b>		<b>TOTAL</b>	<b>14</b>	<b>TOTAL</b>	



## SWES Scholarships

Scholarship funds include the following; check with your Advisor for more details.

Scholarship	Criteria
Buehrer, T-PR	Undergrad/grad in soils/water sci. or env. sci. demonstrating academic excellence/leadership. Named by Dean with approval of OSFA.
Fuller, W.H.	Outstanding undergrads and grads involved in soils and water sci. to svc agriculture in AZ; Recipients must demonstrate academic excellence; good character; professional promise; Nominated by Dept Head of SWES; OSFA apprv.
Jones, Geo-PR	Upper division & grad students in crop production area of AG. 3.0 cum gpa. This award amount to be distributed in consultation with Plant Sciences. Approved by Dean & OSFA.
Smith, H Schol-PR	Upper division; Soils, Water, Eng or Nutri. Schol. sub-committee nominates, Dean/OSFA approves.

### Department of Soil, Water, and Environmental Science Desired ENV5 Undergraduate Outcomes

1. Be able to understand and describe the source and extent of current environmental pollution problems, and understand U.S. laws governing pollution and remediation.
2. Learn and integrate basic scientific principles involved in preventing soil and water degradation, and remediation of contaminated land and water.
3. Understand factors governing fate and transport of water and contaminants in the soil and vadose zone.
4. Have and appreciation and knowledge of the Earth with emphasis on a basic understanding of soils and water sources as critical entities in natural and human-impacted ecosystems.
5. Understand soils as natural entities and the factors of soil formation and erosion.
6. Understand important physical, chemical and biological properties of soils as they relate to their mineralogy, fertility, genesis and classification, biology and biochemistry, and land use management.
7. Understand important physical, chemical and biological properties of water with emphasis on water quality as it relates to human health, sustainable soil-plant systems and the preservation of the natural environment.
8. Understand how to properly collect soil and water samples, identify and implement appropriate analytical techniques, and interpret results.
9. Be proficient in writing a technical report or proposal in the field of Environmental Science.
10. Be able to create a hypothesis, design an experiment to test that hypothesis, analyze the results, and draw appropriate conclusions.