

## Soils & Biogeochemistry

### Why study soils and biogeochemistry?

Soil science and biogeochemistry are concerned with the chemical, physical, geological and biological processes and reactions that govern the composition of the natural environment, and the cycles of matter and energy that transport the Earth's chemical components in time and space. This track teaches students scientific principles, ranging from the molecular to global scales, for managing soil, water and plant resources. The track includes land use, GIS, remote sensing, soil and ecosystem management and restoration, nutrient management, soil and water pollution remediation, and global change. The track emphasizes practical work experience through student internships with state and federal agencies, soil, water and plant labs, and growers. Graduates are qualified for managerial and technical positions with environmental and agricultural businesses. They are prepared for positions in advising, planning, land appraisal, research, and teaching with private, government, and international organizations involved with soil and water development, use, and conservation and global change issues. Some graduates continue in masters and doctoral programs in soil science, environmental toxicology, hydrology, ecology, and plant sciences.



### Preparatory Subject Matter Requirements

Preparatory Subject Matter		Quarter(s) Offered	Units	Completed	Notes
<b>Written and Oral Expression</b>					
UWP 101, 102A-G, 104A-F	Upper Division Writing	I, II, III, IV	4	_____	<u>May test out of requirement</u> <u>UWP 102G, Env Writing, offered I, III</u>
CMN 1, 3, or DRA 10	Public Speaking	I, II, III, IV	4	_____	_____
<b>Biological Sciences</b>					
BIS 2A	Essentials of Life on Earth	I, II, III, IV	5	_____	_____
BIS 2B	Principles of Ecology and Evolution	I, II, III, IV	5	_____	_____
BIS 2C	Biodiversity and the Tree of Life	I, II, III, IV	5	_____	_____
<b>Geology</b>					
<i>Choose one of the following</i>					
GEL 1	The Earth	I, II, III	4	_____	_____
GEL 50 (recommended)	Physical Geology	I, II, III	3	_____	_____
<b>Chemistry</b>					
CHE 2A or 2AH	General Chemistry	I, II, IV	5	_____	_____
CHE 2B or 2BH	General Chemistry	II, III, IV	5	_____	_____
CHE 2C or 2CH (recommended, not required)	General Chemistry	I, III, IV	5	_____	_____
<b>Physics</b>					
<i>Complete either 1AB or 7ABC</i>					
PHY 1A	General Physics	I, II, IV	3	_____	_____
PHY 1B	General Physics	II, III	3	_____	_____
PHY 7A	General Physics	I, II, III, IV	4	_____	_____
PHY 7B	General Physics	I, II, III, IV	4	_____	_____
PHY 7C	General Physics	I, II, III, IV	4	_____	_____
<b>Economics</b>					
ECN 1A	Principles of Microeconomics	I, II, III, IV	4	_____	_____
<b>Mathematics</b>					
MAT 16A, 17A, or 21A	Calculus	I, II, III, IV	3-4	_____	<u>MAT 17AB recommended</u>
MAT 16B, 17B, or 21B	Calculus	I, II, III, IV	3-4	_____	_____
<b>Environmental Science and Policy</b>					
ESP 1	Environmental Analysis	I	4	_____	_____

I = fall quarter, II = winter quarter, III = spring quarter, IV = summer session

\*Course is offered in odd years only (2017, 2019, etc.)

\*\*Course is offered in even years only (2016, 2018, etc.)

## Core Subject Matter Requirements

NOTE: Students graduating with this major are required to attain at least a C average (2.0 GPA) in all courses taken at the university in Depth Subject Matter *and* pass all coursework. See requirements of the College of Agriculture & Environmental Science in the UC Davis General Catalog.

Depth Subject Matter	(29-32 Units)	Prerequisites	Qtr(s)	Units	Completed
<b>Global Environment</b>					
ESM 120	Global Environmental Interactions	One college-level chemistry and biology course	II	4	_____
<b>Ecology</b>					
<i>(Choose one of the following)</i>					
ESP 100	General Ecology	BIS 2A-C and MAT 16A-B, STA 13 recommended	I, III, IV	4	_____
EVE 101	Introduction to Ecology	BIS 2A-C and MAT 16A-B or the equivalent	I, II, III, IV	4	_____
<b>Policy</b>					
ESP 162	Environmental Policy	ECN 1A	II	4	_____
<b>Statistics</b>					
<i>(Choose one of the following – Statistics 100 recommended)</i>					
STA 13	Elementary Statistics	Two years of high school algebra or equivalent in college	I, II, III, IV	4	_____
STA 100	Applied Statistics for Biological Sciences	MAT 16B or the equivalent	I, II, III, IV	4	_____
<b>Environmental Monitoring</b>					
<i>(Choose one of the following)</i>					
ESM 108	Environmental Monitoring	Entry level course in the environmental sciences	III	3	_____
ESP 179	Environmental Impact Assessment	Upper division standing, one course in environmental science	II, IV	4	_____
<b>GIS Technology</b>					
ABT/LDA 150	Introduction to GIS	PLS 21 or equivalent with consent of instructor	I, III	4	_____
<b>Internship</b>					
ESM/ESP 192	Internship	Upper division standing, permission of instructor Variable unit – must take at least 3 units of internship May complete internship in a different area with prior approval (e.g.: PLS, SSC, ATM)	I, II, III, IV	3	_____
<b>Capstone</b>					
ESM 195	Integrating Env Science & Management	Senior standing; Environmental science major (e.g.: ESM, EPAP, ETX, WFC)	III	2	_____
<b>Honors Thesis (Optional)</b>					
ESM 194H	Senior Honors Thesis	Senior standing, Overall GPA of 3.50 or higher; Consent of the master adviser		2-6	_____

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Required Courses	Prerequisites	Qtr(s)	Units	Completed	
<b>Complete</b>					
SSC 100	Principles of Soil Science	CHE 2A-B, PHY 1A-B, BIS 2A; GEL 50, BIS 2C recommended	I	5	_____
<b>Select four soils and biogeochemistry courses</b>					
ESM 100	Principles of Hydrologic Science	CHE 2B; Math 16B; PHY 7A or 9A	I	4	_____
HYD 134	Aqueous Geochemistry	CHE 2B	III	6	_____
SSC 102	Environmental Soil Chemistry	SSC 100 or equivalent and general chemistry	II	3	_____
SSC 105	Field Studies of Soils in CA Ecosystems	SSC 100, 120, or equivalent recommended	IV	5	_____
SSC 107	Soil Physics	SSC 100; ESM 100; MAT 16A or the equivalent	I	5	_____
SSC 109	Sustainable Nutrient Management	SSC 100 or the equivalent	III	4	_____
SSC 111	Soil Microbiology	CHE 2C; BIS 2C	II	4	_____
SSC 120	Soil Genesis, Morphology, & Classification	SSC 100; GEL 50 recommended	III	5	_____
<b>Select two environmental policy courses</b>					
ESM 121	Water Science & Management	PHY 10 or GEL 1	III	3	_____
ESP 165N	Climate Policy	ECN 1A, ESP 1, or consent of instructor	III	3	_____
ESP 166N**	Ocean & Coastal Policy	ESP 1 or consent of instructor	II	3	_____
ESP 171	Urban & Regional Planning	ESP 1	III	4	_____
ESP 172	Public Lands Management	ECN 1A	I	4	_____
ESP 179	Environmental Impact Assessment	Upper division standing; one course in environmental science	II, IV	4	_____
SOC 160	Sociology of the Environment	Upper division standing in Sociology strongly recommended	II	4	_____
<b>Select one land-use analysis course</b>					
ESM 185	Aerial Photo Interp. & Remote Sensing	Upper division standing	I	4	_____
HYD 147	Runoff, Erosion, & Water Quality Management in the Tahoe Basin	PHY 7B or 9B; MAT 16C or 21C; ECI 142, HYD 141, or ESM 100	I	3	_____
SSC 118	Soils in Land Use & the Environment	SSC 100 or consent of instructor	III	4	_____
GEL 134 <sup>†</sup>	Env Geology & Land Use Planning	One course in Geology or consent of instructor		3	_____
<b>Select two biological processes courses</b>					
ATM 160*	Intro to Atmospheric Chemistry	CHE 2B	II	4	_____
ESM/PLS 144	Trees & Forests	PLS 2 or BIS 2C	I	4	_____
ESP 116N*	Oceanography	GEL 1, 2, 16, or 50	II	3	_____
ESP 150A	Physical & Chemical Oceanography	ESP 116; PHY 9B; MAT 22C; CHE 2C; or upper division standing in a natural science and consent of the instructor	I	4	_____
ESP 150C	Biological Oceanography	Acceptance into the Bodega Marine Lab summer program	IV	4	_____
ESP 151 <sup>†</sup>	Limnology	Upper division standing; BIS 2A		4	_____
ESP 155	Wetland Ecology	ESP 100 or PLB 117; ESP 110 or 151 recommended	I	4	_____
PLB/EVE 117	Plant Ecology	BIS 2A-C; PLB 111 recommended	I	4	_____
PLS 130**	Rangelands: Ecology, Cons, & Restoration	BIS 2C; intro ecology course & upper div standing recommended	II	3	_____

<sup>†</sup> Future availability unknown

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