

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
Written and Oral Expression					
UWP 101, or any from the 102 or 104 series	Upper Division Writing	I, II, III, IV	4	_____	<u>May test out of requirement</u>
CMN 1, 3V, 3Y, or DRA 10	Communication	I, II, III, IV	4	_____	_____
Biological Sciences					
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	_____	_____
Geology					
<i>Choose one of the following</i>					
GEL 1	The Earth	I, II, III	4	_____	_____
GEL 50 (recommended)	Physical Geology	I, II, III	3	_____	_____
Chemistry					
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	_____	_____
Physics					
<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	_____	_____
Economics					
ECN 1A, 1AV, or 1AY	Principles of Microeconomics	I, II, III, IV	4	_____	_____
Mathematics					
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	_____	_____
Environmental Science and Policy					
ESP 1	Environmental Analysis	I, IV	4	_____	_____

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

*Course is offered in odd years only (2023, 2025, etc.)

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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	Prerequisites	Qtr(s)	Units	Completed	
Global Environment					
ESM 120	Global Environmental Interactions	One college-level chemistry and biology course	II	4	_____
Ecology					
<i>(Choose one of the following)</i>					
ESP 100	General Ecology	BIS 2A-C; MAT 16A-B or 17A-B or 21A-B; STA 13 recommended	I, II, IV	4	_____
EVE 101	Introduction to Ecology	BIS 2A-C; MAT 16A-B or 17A-B or 21A-B; or equivalent	I, II, III, IV	4	_____
Policy					
ESP 162	Environmental Policy	ECN 1A	II	4	_____
Statistics					
<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 17B or 21B	I, II, III, IV	4	_____
Environmental Monitoring					
<i>(Choose one of the following)</i>					
ATM 124	Meteorological Instruments & Observations	ATM 60	I	3	_____
ESM 108	Environmental Monitoring	Entry level course in the environmental sciences	III	3	_____
ESP 151L	Limnology Lab	ESP 151 (can be concurrent)	III	3	_____
ESP 179	Environmental Impact Assessment	ESP 1 or the equivalent	II, IV	4	_____
Environmental Data Science					
<i>(Choose one of the following)</i>					
ABT/LDA 150	Introduction to GIS	None	I, II, III	4	_____
ESP 106	Environmental Data Science	STA 13 or 32 or 100 (can be concurrent)	II	4	_____
Internship					
ESM/ESP 92/192	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	_____
Capstone					
ESM 195	Integrating Env Science & Management	Senior standing in ESM	III	2	_____
Honors Thesis (Optional)					
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	
Complete					
SSC 100	Principles of Soil Science	College-level course in each of CHE, PHY, BIS, and GEL recommended	I	5	_____
Select four soils and biogeochemistry courses					
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 and 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	BIS 2C recommended	II	4	_____
SSC 112	Soil Ecology	SSC 100 or equivalent recommended	I	3	_____
SSC 118	Soils in Land Use & the Environment	SSC 100 or equivalent recommended	III	4	_____
SSC 120	Soil Genesis, Morphology, & Classification	SSC 100; GEL 50 recommended	III	5	_____
Select two environmental policy courses					
ESM 121	Water Science & Management	PHY 10 or GEL 1	III	3	_____
ESP 165	Climate Policy	ECN 1A or ESP 1 or consent of instructor	I	3	_____
ESP 166	Ocean & Coastal Policy	ESP 1 or consent of instructor	I	3	_____
ESP 171	Urban & Regional Planning	ESP 1 recommended	III	4	_____
ESP 174	Environmental Justice Policy & Practice	ESP 1 or equivalent recommended	III	4	_____
ESP 172	Public Lands Management	ECN 1A and POL 1 recommended	I	4	_____
ESP 179	Environmental Impact Assessment	ESP 1 or the equivalent	II, IV	4	_____
SOC 160	Sociology of the Environment	SOC 1 or 2 or 3 recommended	I	4	_____
Select one land-use analysis course					
ESM 185	Aerial Photo Interp. & Remote Sensing	Upper division standing	I	4	_____
HYD 147	Runoff, Erosion & Water Quality Mgmt	PHY 7B or 9B; MAT 16C or 17C or 21C; ECI 142 or HYD 141 or ESM 100	I	3	_____
SSC 118	Soils in Land Use & the Environment	SSC 100 or equivalent recommended	III	4	_____
GEL 134	Env Geology & Land Use Planning	One course in Geology or consent of instructor		3	_____
Select two biological or physical processes courses					
ATM 160**	Intro to Atmospheric Chemistry	CHE 2B	II	4	_____
ESM/PLS 144	Trees & Forests	PLS 2 or BIS 2C	I	4	_____
ESP/GEL 116N	Oceanography	GEL 1 or 2 or 16 or 50	II or III	3	_____
ESP/GEL 150A**	Physical & Chemical Oceanography	ESP 116N; PHY 7B or 9B; MAT 16C or 17C or 21C; CHE 2C or GEL 55	III	4	_____
ESP/GEL 150C**	Biological Oceanography	Acceptance into the Bodega Marine Lab summer program	IV	4	_____
ESP 151	Limnology	BIS 2A and 2B; BIS 2C and ESP 100 or EVE 101 recommended	III	4	_____
ESP 155	Wetland Ecology	BIS 2A or equivalent; ESP 100 or EVE 101 recommended		4	_____
GEL 132	Introductory Inorganic Geochemistry	GEL 60 (can be concurrent); CHE 2B			_____
PLB/EVE 117	Plant Ecology	BIS 2A-C; PLB 111 recommended	I	4	_____
PLS 130	Grassland Ecology	PLS 2 or BIS 2B or BIS 2C or consent of instructor	II	3	_____

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