

# Environmental Data Science



## Why study environmental data science?

The Environmental Data Science track focuses on utilizing geospatial technology and data science for understanding and solving complex environmental issues across the Earth system components. The curriculum is designed to prepare students for a growing job market in need of interdisciplinary professionals with geospatial and analytical skills. The training includes the concepts and fundamentals on data science and remote sensing, and computer-based hands on experience in geographical information systems (GIS), spatial analysis, and image processing. Students will be prepared with knowledge and core analytical skill sets for a broad range of professional paths geared towards data driven solutions, in industry, non-profit organizations, state and government agencies, and academia.

## Preparatory Subject Matter Requirements

Preparatory Subject Matter		Quarter(s) Offered	Units	Completed	Notes
<b>Written and Oral Expression</b>					
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	_____	_____
<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, 1AV, or 1AY	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, IV	4	_____	_____

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\*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	
<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; 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	_____
<b>Policy</b>					
ESP 162	Environmental Policy	ECN 1A	II	4	_____
<b>Statistics</b>					
<i>(Choose one of the following – Statistics 100 recommended, cannot be completed with STA 13)</i>					
STA 32	Gateway to Statistical Data Science	MAT 16B or 17B or 21B with a C- or better	I, II, III	4	_____
STA 100	Applied Statistics for Biological Sciences	MAT 16B or 17B or 21B with a C- or better	I, II, III, IV	4	_____
<b>Environmental Monitoring</b>					
<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	_____
<b>Geographic Information Systems</b>					
ABT/LDA 150	Introduction to GIS	None	I, II, III	4	_____
<b>Internship</b>					
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	_____
<b>Capstone</b>					
ESM 195	Integrating Env Science & Management	Senior standing in ESM	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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## Environmental Data Science

Required Courses	Prerequisites	Qtr(s)	Units	Completed	
<b>Environmental Data Science</b>					
ESP 106	Environmental Data Science	STA 13 or 32 or 100 (can be concurrent)	II	4	_____
<b>Programming</b>					
ECS 32A	Introduction to Programming	None	I, II, III, IV	4	_____
<b>Select one data analysis course</b>					
ABT 181N*	Concepts & Methods in GIS	ABT/LDA 150 or consent of instructor	II	4	_____
ABT/HYD 182**	Environmental Analysis with GIS	ABT 150 or equiv GIS experience, biology and/or ecology courses rec.	II	4	_____
<b>Select one remote sensing course</b>					
ESM 185	Aerial Photo Interp. & Remote Sensing	Upper division standing	I	4	_____
ESM 186	Environmental Remote Sensing	MAT 16B; PHY 7C or 9B; upper division standing; LDA 150 rec.	II	5	_____
<b>Select one environmental policy course</b>					
ESP/ECI 163**	Energy & Env Aspects of Transportation	Upper division standing in environmental studies	I	4	_____
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 169**	Water Policy & Politics	ECN 1A or POL 1 recommended	III	3	_____
ESP 171	Urban & Regional Planning	ESP 1 or ESP 161 or ESP 179 recommended	III, IV	4	_____
ESP 172	Public Lands Management	ECN 1A and POL 1 recommended	I	4	_____
ESP 174	Environmental Justice Policy & Practice	ESP 1 or equivalent recommended	III	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	_____
<b>Select one quantitative environmental science course</b>					
ATM 120	Atmos Thermodynamics & Cloud Physics	MAT 21C; PHY 9B; ATM 60 (can be concurrent)	I	4	_____
ESP 121	Population Ecology	BIS 2B; MAT 16B or 17B or 21B or 21BH	II	4	_____
HYD 143**	Echohydrology	ESP 1 or ESM 100 or ESM 108 or ESM 120 or GEL 1 or SSC 100	II	4	_____
PLS 123	Intro to Plant & Crop System Modeling	College algebra/precalculus and college physics recommended	I	3	_____
WFC 122	Population Dynamics & Estimation	MAT 16A; MAT 16B; STA 13; BIS 2A, 2B, and 2C	III	4	_____
<b>Select two statistical analysis courses</b>					
STA 104	Nonparametric Statistics	STA 13 or 32 or 100 with a C- or better	I, II, III	4	_____
STA 106	Analysis of Variance	STA 13 or 32 or 100 with a C- or better	I, II, III, IV	4	_____
STA 108	Regression Analysis	STA 13 or 32 or 100 with a C- or better	I, II, III, IV	4	_____
STA 130A	Mathematical Statistics: Brief Course	MAT 16C or 17C or 21C; STA 13 or 32 or 100; all with a C- or better	I, II	4	_____
STA 130B	Mathematical Statistics: Brief Course	STA 130A or 131A or MAT 135A with a C- or better	II, III	4	_____
STA 135	Multivariate Data Analysis	STA 130B or 131B or STA 106 and 108 with a C- or better	II, III	4	_____
STA 137	Applied Time Series Analysis	STA 108 with a C- or better	I, II, III	4	_____
STA 141A	Fundamentals of Statistical Data Science	STA 106 or 108 with a C- or better	I, II, III	4	_____
STA 141B	Data & Web Technologies for Data Analysis	STA 141A with a C- or better	I, II, III	4	_____
STA 142A	Statistical Learning	STA 141A; STA 130A or 131A or MAT 135A with a C- or better	II	4	_____

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<b>Select one physical processes course</b>					
ATM 110*	Weather Observation & Analysis	ATM 60	II	4	_____
ATM 116	Modern Climate Change	None	I	3	_____
ATM 133	Biometeorology	MAT 16B; one course in a biological discipline or consent of instructor	II	4	_____
ESM 100	Principles of Hydrologic Science	CHE 2B; MAT 16B; PHY 7A or 9A	I	4	_____
ESM 121	Water Science & Management	PHY 10 or GEL 1	III	3	_____
ESM 131	Air as a Resource	CHE 10 or 2A; CHE 2B	II	3	_____
SSC 100	Principles of Soil Science	College level course in chem, physics, bio, and geology recommended	I	5	_____
<b>Select one biological processes course</b>					
ESP 124	Marine & Coastal Field Ecology	Acceptance into the Bodega Marine Lab summer program	IV	3	_____
ESP/GEL 150C**	Biological Oceanography	Acceptance into the Bodega Marine Lab summer program	IV	4	_____
ESP 151	Limnology	BIS 2A; BIS 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	_____
EVE/PLB 117	Plant Ecology	BIS 2A; BIS 2B; BIS 2C; PLS 111 recommended	I	4	_____
EVE 147	Biogeography	BIS 2B	I	4	_____
GEL 136	Ecogeomorphology of Rivers & Streams	By application only, not offered every year	III	5	_____
PLS 101	Agriculture & the Environment	PLS 2 or consent of instructor	II	3	_____
PLS 130	Grassland Ecology	PLS 2 or BIS 2B or BIS 2C, upper division standing	II	3	_____
PLS 163	Ecosystem & Landscape Ecology	ESP 100 or EVE 117 or ESM 144 or PLS 162 or ENH 160 or EVE 101	II	4	_____
WFC 125*	Tropical Ecology & Conservation	ESP 100 or EVE 101	I	4	_____
WFC 168	Climate Change Ecology	BIS 2B; ESP 100 or EVE 101	II	4	_____

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