Environmental Data Science

Why study environmental data science?

The Environmental Data Science track focuses on applying 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
Written and Oral Expression					
UWP 101, or any from the 102 or 104 series	Upper Division Writing	I, II, III, IV	4		May test out of requirement
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					
Choose one of the following					
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					
Complete either 1AB or 7ABC					
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		MAT 17AB recommended
MAT 16B, 17B, or 21B	Calculus	I, II, III, IV	3-4		
Environmental Science and Policy					
ESP 1	Environmental Analysis	I, IV	4		

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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					
(Choose one of the following)					
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					
(Choose one of the following – Statistics 100 recommended, cannot be completed with STA 13)					
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	
Environmental Monitoring					
(Choose one of the following)					
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	
Geographic Information Systems					
ABT/LDA 150	Introduction to GIS	None	I, II, III	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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Environmental Data Science

Required Courses		Prerequisites	Qtr(s)	Units	Completed
Environmental Data Science					
ESP 106	Environmental Data Science	STA 13 or 32 or 100 (can be concurrent)	II	4	
Programming					
ECS 32A	Introduction to Programming	None	I, II, III, IV	4	
Select one data analysis course					
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	
Select one remote sensing course					
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	
Select one environmental policy course					
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	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	
Select one quantitative environmental science course					
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		3	
WFC 122	Population Dynamics & Estimation	MAT 16A; MAT 16B; STA 13; BIS 2A, 2B, and 2C	III	4	
Select two statistical analysis courses					
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 108with 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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Required Courses		Prerequisites	Qtr(s)	Units	Completed
Select one physical processes course					
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	
Select one biological processes course					
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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