ENVIRONMENTAL SCIENCES, MS

Please click here (http://catalog.ucdenver.edu/cu-denver/graduate/ schools-colleges-departments/college-liberal-arts-sciences/geographyenvironmental-sciences/) to see Geography and Environmental Sciences department information.

Program Director: Rafael Moreno Office: North Classroom Fax: 303-315-7556 E-mail: Rafael.Moreno@ucdenver.edu Website: MS in Environmental Sciences (https://clas.ucdenver.edu/ges/ programs/master-science-environmental-sciences/)

Overview

Environmental Sciences is a multidisciplinary study of the natural/ physical environment. Academic fields involved in environmental sciences include chemistry, biology and ecology, physics, geology, geography, anthropology, engineering, political science, law, economics and the health sciences. Students planning to pursue the MS in Environmental Sciences must either have earned a bachelor's degree or have taken significant course work in the natural/physical sciences or engineering and completed several other prerequisites (see the following graduate information).

Environmental careers encompass a broad range of professions, from those with a strong foundation in the natural/physical sciences or engineering to those based in the social sciences and/or humanities. Students interested in environmental issues and careers should investigate all our program options and specializations before deciding which path to follow. At CU Denver, the MS in Environmental Sciences emphasizes the natural/physical sciences and engineering with the addition of the social sciences and humanities.

The MS in Environmental Sciences degree is designed to provide training in natural/physical sciences and social sciences. The goals of the program are (1) to enhance the interdisciplinary communication and analytical skills of the student, and (2) to provide a multidisciplinary approach for intensive and hands-on studies of particular environmental issues. Students will receive instruction in the physical and biological dynamics of various ecosystems, environmental engineering and socioeconomic issues associated with environmental analysis.

Graduates of the MS in Environmental Sciences program are involved in many different areas, such as reviewing environmental impact statements, monitoring groundwater quality or air quality and communicating with the public. Our students have great success finding employment in various agencies (U.S. Environmental Protection Agency, U.S. Geological Survey, Colorado State Department of Public Health and Environment) and private-sector environmental consulting and engineering firms.

These program requirements are subject to periodic revision by the academic department, and the College of Liberal Arts and Sciences reserves the right to make exceptions and substitutions as judged necessary in individual cases. Therefore, the College strongly urges

students to consult regularly with their program advisor to confirm the best plans of study before finalizing them.

Financial Aid

There are four types of financial aid available: student hourly teaching assistantship; research assistantship positions funded by grants to specific program faculty; paid internships and part-time employment organized through the department with professional organizations; and the regular package of financial aid (primarily loans) available through the financial aid office on the Denver campus. Our program also accommodates working students and offers many of core classes one/week or in the evening to accommodate work schedules. Incoming students will be automatically considered for program-distributed assistance at the time of admission to the program. Continuing students will be regularly apprised of available aid and positions. All other aid should be requested through the CU Denver Financial Aid Office, Student Commons Building 5th floor, Campus Box 125, P.O.Box 173364, Denver, CO 80217-3364. Telephone: 303-315-1850.

Internships

Students in the MS in Environmental Sciences program are strongly encouraged to contact the Experiential Learning Center for internships and paid positions related to environmental sciences. The Experiential Learning Center is located in the Tivoli Student Union, Suite 260. Telephone: 303-556-2250. The LynxConnect Career Center also located in the Tivoli Student Union Suite 439. Many students have had internships in federal agencies, such as the U.S. Environmental Protection Agency and the U.S. Geological Survey.

Graduate Education Policies and Procedures apply to this program.

Program Requirements

- 1. Students must complete a minimum of 36 credit hours from approved courses.
- 2. Students must complete a minimum of 36 graduate (5000-level) or higher credit hours.
- Students must earn a minimum grade of B (3.0) or better in all core courses, a B- (2.7) in all other courses applied to the degree and must achieve a minimum cumulative program GPA of 3.0. Courses taken using P+/P/F or S/U grading cannot apply to degree requirements.
- 4. Students must complete all coursework with CU Denver faculty.

Program Restrictions, Allowances and Recommendations

- 1. Many of the elective courses have prerequisites; student must have met these requirements in order to take the course.
- A given course may only be used for one option, even if it is listed in several options. Other courses maybe offered that will be acceptable as electives with approval of the option advisor and the director of the program.
- Courses applied to either a certificate* or an MS degree may later be applied toward the other if all pertinent coursework is completed within a five year time period.
- 4. Students should fill out and submit all relevant department forms for their files. Importantly, all petitions for course substitutions and identification of where courses fit as electives, with the subsequent approval/denial, should be submitted to this file.

- 5. By the end of the first semester, each student should identify and declare whether or not they are pursuing the thesis or non-thesis option. If intending to pursue the thesis option, the student should identify and gain agreement from a content advisor for guiding the thesis, filling out and submitting the appropriate departmental form.
- 6. Students may count up to six credit hours of independent study, with a maximum of three credit hours per independent study towards elective credit in the major as approved by the Graduate Director. No more than three credit hours of independent study may be taken with the same instructor and they may not be taken in the same term.
- Students may count up to six credit hours of internship in total, but three credit hours per internship and per entity (sponsorship may be with same professor sponsor).
- Students may not count 4000-level courses towards electives in the program; this may be petitioned to the Graduate Committee in exceptional cases.
- 9. Students may take a maximum of two online courses, or petition to the GES Graduate Committee beyond two.
- Students may enroll in thesis preparation and writing hours only after submission of a signed committee form, which requires approval of the thesis proposal.
- 11. Students will not receive a grade for thesis preparation and writing hours until the thesis is successfully defended.
- 12. Students must follow the graduate admissions deadlines for submission of paperwork for the graduation application, comprehensive exam, and any other deadlines. Links to these can be found on the GES/MS website.
- 13. Work submitted for the environmental sciences options must have a grade of B (3.0) or better.
- 14. All students must complete two GES-approved, graduate-level techniques/methods-based class (not including the practicum).
- 15. Elective credits may be completed using up to three credit hours of Independent Study and/or three credit hours of Internship Study.
- 16. The Geospatial, Environmental Education, and Sustainable Urban Agriculture options of the program lead towards independent graduate certificates. These certificates may be earned without entrance into the MS in environmental sciences program. (See the Geographic Information Science Graduate Certificate, Sustainable Urban Agriculture Graduate Certificate, and Environmental Science Education Graduate Certificate descriptions.)
- 17. The number of credits required to reach 36 total credits will depend on (a) whether a student is on Plan 1 or Plan 2, and (b) how many credit hours are compiled in the core classes.
- 18. The MS in Environmental Sciences courses are offered in both GES and our partner departments. The degree is offered through the College of Liberal Arts and Sciences with the cooperation of the College of Engineering, Design and Computing. In addition, some courses offered by the College of Architecture and Planning, the School of Public Affairs and the Business School are relevant and applicable to the program.

The MS in Environmental Sciences is a 36-hour program that provides students with two alternate plans: Plan I is a thesis path, while Plan II is a non-thesis path.

Code	Title	Hours
Complete the follo	owing required courses:	6
ENVS 6002	Research Topics in Environmental Sciences	
GEOG 5265	Sustainability in Resources Management	
or GEOG 54	14 6 cience, Policy and the Environment	
Complete a minin one course from e hydrosphere, lithc	num of 12 Physical/ Ecological Core credit hours, with each of the content spheres: atmosphere, biosphere, psphere/cryosphere.	12
Atmosphere		
ENVS 5720	Climate Change: Causes, Impacts and Solutions	
ENVS 5730	Air Quality Modeling and Analysis	
Biosphere		
ENVS 5010	Landscape Biogeochemistry	
ENVS 5731	Mountain Biogeography	
ENVS 5750	Beeography: Geography of Bees	
Hydrosphere		
ENVS 5280	Environmental Hydrology	
ENVS 5410	Aquatic Chemistry	
GEOG/GEOL 5251	Fluvial Geomorphology	
Lithosphere/Cyro	osphere	
ENVS 5340	Equity & Culture in Science Education: Local/ Global	
ENVS 5740	Soil Science and Geography	
GEOG 5240	Applied Geomorphology	
Complete a minin list or complete tl	num of 12 elective credits from the approved elective he required coursework for a specialization option. ¹	12
Approved Electiv	re Courses (p. 3)	
Climate Systems	s (p. 3)	
Ecosystems (p. 3	3)	
Environmental H	ealth (p. 3)	
Environmental S	cience Education (p. 4)	
Environmental S	cience, Policy and Management (p. 4)	
Geospatial Analy	vsis Option (p. 4)	
Sustainable Urba	an Agriculture (p. 4)	
Water Systems (p. 4)	
Complete the The	sis or Non-Thesis option to complete the degree.	e
Plan I Thesis Opt	tion (p. 4)	
Plan II Non-Thes	is Option (p. 4)	
Total Hours		36

¹ To fulfill the elective requirement, students may choose to fulfill one of the following Specialization Options offered in environmental sciences: Climate System; Ecosystems; Environmental Health; Environmental Science Education; Environmental Science, Policy and Management; Geospatial Analysis; Sustainable Urban Agriculture; or Water Systems. Students must have the prerequisites for each course and must meet the requirements listed in the notes below. Contact the option advisor for the particular option of interest before starting. Upon graduation, the option will be noted on the student's transcript.

Electives

Code	Title	Hours
Complete 12 elect	ive credits from the following	12
BIOL 5154	Conservation Biology	
BIOL 5335	Plant Structure and Development	
BIOL 5345	Flora of Colorado	
BIOL 5415	Applied Microbial Ecology	
BIOL 5460	Environmental Toxicology	
BIOL 6764	Biological Data Analysis	
CVEN 5333	Surface Water Hydrology	
CVEN 5334	Groundwater Hydrology	
CVEN 5335	Vadose Zone Hydrology	
ENVS 5020	Earth Environments and Human Impacts	
ENVS 5305	Water Quality and Resources	
ENVS 5450	Urban Food and Agriculture: Perspectives and Research	
ENVS 5460	Sustainable Urban Agriculture Field Study I	
ENVS 5470	Sustainable Urban Agriculture Field Study II	
ENVS 5650	Environmental Education	
ENVS 5939	Internship	
ENVS 6200	Risk Assessment	
ENVS 6230	Environmental Epidemiology	
ENVS 6800	Community-Based Research Practicum	
ENVS 6840	Independent Study: ENVS	
GEOG 5050	Applied Spatial Statistics	
GEOG 5060	Remote Sensing I: Introduction to Environmenta Remote Sensing	l
GEOG 5070	Remote Sensing II: Advanced Remote Sensing	
GEOG 5080	Introduction to GIS	
GEOG 5081	Cartography	
GEOG 5085	GIS Applications for the Urban Environment	
GEOG 5090	Environmental Modeling with Geographic Information Systems	
GEOG 5091	Open Source Software for Geospatial Applicatio	ns
GEOG 5092	GIS Programming and Automation	
GEOG 5095	Deploying GIS Functionality on the Web	
GEOG 5230	Hazard Mitigation and Vulnerability Assessment	t
GEOG 5235	GIS Applications in the Health Sciences	
GEOG 5335	Climate Change & Society	
GEOG 5350	Environment and Society in the American Past	
GEOG 5420	The Politics of Nature	
GEOG 5710	Disasters, Climate Change, and Health	
GEOG 5995	Global Study Topics	
GEOG 6700	Integrated Methods	
GEOG 6800	Community-Based Research Practicum ¹	

¹ Thesis students may also count ENVS 6800 Community-Based Research Practicum as an elective (the course is required for nonthesis students).

Climate Systems

Advisors: Ben Crawford (Benjamin.Crawford@ucdenver.edu) & Kathy Kelsey (%20Katharine.Kelsey@ucdenver.edu)

Code	Title	Hours		
Complete the following required courses:				
ENVS 5500	Topics in Environmental Sciences (Urban Climat and Air Quality)	e		
ENVS 5720	Climate Change: Causes, Impacts and Solutions			
Complete two of th	e following elective courses:	6		
ENVS 5010	Landscape Biogeochemistry			
ENVS 5730	Air Quality Modeling and Analysis			
ENVS 5731	Mountain Biogeography			
GEOG 5270	Glacial Geomorphology			
Total Hours 12				
Ecosystems				
Advisor. Christy Briles (Christy.Briles@ucdenver.edu)				
Code	Title	Hours		
Complete the follow	wing required courses.	6		

Total Hours		12
ENVS 5731	Mountain Biogeography	
ENVS 5750	Beeography: Geography of Bees	
ENVS 5740	Soil Science and Geography	
ENVS 5720	Climate Change: Causes, Impacts and Solutions	
ENVS 5410	Aquatic Chemistry	
BIOL 6764	Biological Data Analysis	
BIOL 5460	Environmental Toxicology	
BIOL 5415	Applied Microbial Ecology	
BIOL 5345	Flora of Colorado	
BIOL 5335	Plant Structure and Development	
BIOL 5154	Conservation Biology	
Complete two of th	ne following elective courses:	6
ENVS 5010	Landscape Biogeochemistry	
BIOL 5415	Applied Microbial Ecology	
Complete the follo	wing required courses:	6

Environmental Health

Advisor: Peter (Peter.Anthamatten@ucdenver.edu)Anthamatten

Code	Title	Hours
Complete a minimu	Im of one of the following methods courses:	3
BIOS 6601	Applied Biostatistics I	
GEOG 5235	GIS Applications in the Health Sciences	
ENVS 6220	Toxicology	
or EHOH 66	Toxic Effects of Environmental and Workplace Ag	gents
ENVS 6230	Environmental Epidemiology	
or EHOH 66	Environmental & Occupational Epidemiology	
Complete a minimu	Im of one of the following applications courses:	3
EHOH 6619	Environmental Exposures and Health Effects	
EHOH 6624	Infectious Diseases, Environmental Contexts	
EHOH 6627	Water Quality and Public Health	
EHOH 6635	Climate Change and Health	
GEOG 5230	Hazard Mitigation and Vulnerability Assessment	
GEOG 5710	Disasters, Climate Change, and Health	

Complete six additional elective credits from the approved methods and applications courses.

12

Environmental Science Education

Advisor: Bryan Wee (Bryan.Wee@ucdenver.edu)

Code	Title	Hours
Complete the following required courses:		
ENVS 5650	Environmental Education	
GEOG 5150	Place, Landscape, and Meaning	
Complete two of th	he following elective courses:	6
GEOG 5300	Children's Geographies	
or ENVS 530©hildren's Geographies		
GEOG 5440	Science, Policy and the Environment	
GEOG 5995	Global Study Topics	
ENVS 5340	Equity & Culture in Science Education: Local/ Global	
or SCED 534	4 Equity & Culture in Science Education: Local/Glo	cal
Total Hours		

Environmental Science, Policy and Management

Advisors: Rafael Moreno (Rafael.Moreno@ucdenver.edu) and Gregory Simon (Gregory.Simon@ucdenver.edu)

Code	Title	Hours
Complete the following required courses:		6
GEOG 5265	Sustainability in Resources Management	
GEOG 5440	Science, Policy and the Environment	
Complete two of th	ne following elective courses:	6
GEOG 5230	Hazard Mitigation and Vulnerability Assessment	t
GEOG 5335	Climate Change & Society	
GEOG 5420	The Politics of Nature	
GEOG 5680	Urban Sustainability and Resiliency: Perspective and Practice	S
GEOG 5710	Disasters, Climate Change, and Health	
GEOG 5995	Global Study Topics	
ENVS 5305	Water Quality and Resources	
ENVS 6200	Risk Assessment	
Total Hours 1		

Geospatial Analysis Option

Advisors: Peter (Peter.Anthamatten@ucdenver.edu)Anthamatten or Rafael Moreno (Rafael.Moreno@ucdenver.edu)

Code	Title	Hours
Complete the follo	wing required courses:	6
GEOG 5080	Introduction to GIS	
GEOG 5090	Environmental Modeling with Geographic Information Systems	
Complete two of th	ne following elective courses:	6
CVEN 5385	GIS Relational Database Systems	
GEOG 5050	Applied Spatial Statistics	
GEOG 5091	Open Source Software for Geospatial Applicatio	ns

	GEOG 5092 GIS Programming and Automation					
	GEOG 5095	Deploying GIS Functionality on the Web				
	Total Hours 1:					
	Sustainable Urban Agriculture					
1	Advisor: Amanda	Weaver (Amanda.Weaver@ucdenver.edu)				
	Code	Title	Hours			
	Complete the follo	wing required courses:	6			
	ENVS 5450	Urban Food and Agriculture: Perspectives and Research				
	ENVS 5460	Sustainable Urban Agriculture Field Study I				
	Complete two of tl	he following elective courses:	6			
	ENVS 5470	Sustainable Urban Agriculture Field Study II				
	GEOG 5060	Remote Sensing I: Introduction to Environmental Remote Sensing				
	GEOG 5085	GIS Applications for the Urban Environment				
	GEOG 5235	GIS Applications in the Health Sciences				
	GEOG 5640	Urban Geography: Denver and the U.S.				
	GEOG 5680	Urban Sustainability and Resiliency: Perspective and Practice	S			
	Total Hours 12					

Water Systems

6

Advisors: Anne Chin (Anne.Chin@ucdenver.edu) and Tom Duster (Thomas.Duster@ucdenver.edu)

Code	Title	Hours
Complete the follo	7	
ENVS 5280	Environmental Hydrology	
ENVS 5410	Aquatic Chemistry	
Complete two of th	ne following elective courses:	6
CVEN 5333	Surface Water Hydrology	
CVEN 5334	Groundwater Hydrology	
CVEN 5335	Vadose Zone Hydrology	
CVEN 5401	Introduction to Environmental Engineering	
ENVS 5305	Water Quality and Resources	
GEOG 5240	Applied Geomorphology	
GEOG 5251	Fluvial Geomorphology	
GEOG 5270	Glacial Geomorphology	
Total Hours 13		

Plan I-Thesis Option

Code	Title	Hours
Complete the follo	owing	6
GEOG 6750	Research Design	
GEOG 6950	Master's Thesis	

Plan II-Non-Thesis Option

Code	Title	Hours
Complete additional elective credit hours from courses in an approved		6
course list and the following:		
ENVS 6800	Community-Based Research Practicum	

To learn more about the Student Learning Outcomes for this program, please visit our website (https://clas.ucdenver.edu/ges/programs/master-science/ms-learning-goals-objectives/).