

CIVIL ENGINEERING AND URBAN SUSTAINABILITY (PH.D. DUAL-TITLE)

Students admitted to the Ph.D. program in Civil and Environmental Engineering can apply to earn a Ph.D. with a major in Civil and Environmental Engineering and a dual-title in Urban Sustainability. This dual-title degree is designed to prepare professionals to solve challenging urban problems that require working across disciplines. Students enrolled in the dual-title program take courses in topics and develop specific skills relating to urban sustainability. Students in Civil and Environmental Engineering will also conduct an internship or science exchange in Urban Sustainability, help develop and participate in colloquia and seminars, perform community service, and write funding proposals. The dual-title coursework follows competencies outlined by the Transformative Research in Urban Sustainability Training program.

Coursework for the Civil and Environmental Engineering-Urban Sustainability Degree is currently offered in ten departments across campus. To earn the urban sustainability dual title, students first must be admitted into the doctoral programs in Civil and Environmental Engineering. Coursework must include five of six core courses shown in Table 1 (BIO 7310/CE 7311 and GS 0900 are required) plus 8 credits of urban sustainability coursework selected from Table 2 with the approval of their doctoral advisor, who will review the courses for adequate interdisciplinary representation. Alternative elective courses can be substituted for those shown in Table 2 with the approval of the Civil and Environmental Engineering Urban Sustainability Leader, Dr. Carol Miller. Of the core courses, a seminar course, "Sustainability of Urban Environmental Systems," is suitable for cross-listing in all departments that offer the urban sustainability dual title degree (currently listed as BIO 7310/CE 7311).

Doctoral students may take a maximum of six credits of CE 7990 and a maximum of six credits of CE 7996. Registration in CE 7990 and/or CE 7996 must be approved by a faculty advisor and the graduate program director.

Table 1. Core Courses for all Urban Sustainability Dual Title Degrees

Code	Title	Credits
CE 7311	Sustainability of Urban Environmental Systems	2
CE 7995	Special Topics in Civil Engineering II (Environmental Systems, Economics, and Society)	3
ANT 5060	Urban Anthropology	3
COM 7170	Health and Risk Communication	3
GS 0900	Essential Research Practices: Responsible Conduct of Research	0
UP 6470	Environmental Planning	3

Table 2. Elective Coursework Eligible for Civil and Environmental Engineering-Urban Sustainability Degree

Code	Title	Credits
ANT 5565	Urban Archaeology	3
ANT 6570	Archaeological Laboratory Analysis	4
BIO 5040	Biometry	4
BIO 5180	Field Investigations in Biological Sciences	0-12
BIO 7540	Landscape Ecology	3
BIO 6420	Ecotoxicology and Risk Assessment	3

CE 6160	Principles of Atmospheric Chemistry and Applications	3
CE 6270	Sustainability Assessment and Management	3
CE 7160	Advanced Principles of Atmospheric Chemistry and Applications	3
CE 7240	Advanced Air Pollution Engineering	3
CE 7280	Applied Environmental Microbiology	3
CE 7995	Special Topics in Civil Engineering II (River Assessment and Restoration)	3
COM 7160	Crisis Communication	3
ECO 6200	Advanced Regulation and Regulated Industries	4
ECO 6520	Advanced State and Local Public Finance	4
ECO 6800	Advanced Urban and Regional Economics	4
ESG 5000	Geological Site Assessment	4
ESG 5510	Environmental Fate and Transport of Pollutants	4
ESG 5610	Special Topics in Environmental Science and Geology	1
ESG 5650	Applied Geologic Mapping	4
FPH 7420	Principles of Environmental Health	3
LEX 7231	Environmental Law	2-3
PHC 7410	Principles of Toxicology	3
or BIO 7011	Principles of Toxicology	
PSC 6910	Pharmaceutical Waste: Environmental Impact and Management	2-3
or CE 6910	Pharmaceutical Waste: Environmental Impact and Management	
UP 5110	Urban Planning Process	3
UP 5430	Cities and Food	3
UP 6120	Planning Studies and Methods	4
UP 6260	Land Use Policy and Planning	3
UP 6700	Geographic Information Systems	4

Other activities required for the Civil and Environmental Engineering-Urban Sustainability Degree are the following:

1. Community service: participate in two events per year or an equivalent commitment to citizen science, stewardship or outreach/education projects with community group partners.
2. Participate in Colloquium: help develop and attend an annual series of talks given by visiting lecturers across disciplines.
3. Prepare and submit an external proposal to a funding agency.

These requirements will be satisfied in the core courses. Specifically, participation in colloquia and seminars is a requirement in *Sustainability of Urban Environmental Systems* and *Urban Anthropology*, partaking in community service is an activity in the *Environmental Planning and Urban Ecology* class, and writing funding proposals is a course assignment in *Sustainability of Urban Environmental Systems* and *Environmental Systems, Economics and Society*. In addition, the requirement of community service will also be part of the course requirement for *Essential Research Practices: Responsible Conduct of Research* (GS 0900).

In addition, doctoral students will be strongly encouraged to:

1. Participate in an internship in an applied setting with a partner organization in urban sustainability. Example eligible organizations with which the Civil and Environmental Engineering Department has previously partnered include Southwest Detroit Environmental Vision, Macomb County, U.S. Army Corps of Engineers and Great Lakes Water Authority, but participation is not limited to these.

2. Produce a video documentary with their doctoral research team about the interdisciplinary sustainability problem their research is addressing, translating scientific content for a wide audience.
3. Participate in the WSU Research and Academic Development Seminar Series, which provides graduate training and career development workshops, to help prepare students to complete the required funding proposal and to envision perspectives to consider during documentary and publication preparation.
4. Produce a collaborative publication with a doctoral research team.
5. Develop a 2 credit capstone seminar course in collaboration with other students pursuing the Urban Sustainability Dual Title Degree that they will co-teach with the guidance of faculty. The capstone course will tie together and demonstrate the interconnected nature of urban sustainability topics and will be available to fellow Dual Title Degree students and other graduate and undergraduate students.
6. Include undergraduate students in field work, laboratory analysis and report-writing, both to foster greater participation in later graduate studies by those students, and also to develop the mentoring skills of the doctoral students.