ENVIRONMENTAL AND SUSTAINABILITY ENGINEERING (M.S.)

The Master of Science in Environmental and Sustainability Engineering aims to advance environmental engineering and sustainability to enhance human well-being through the development, application, and dissemination of relevant knowledge. The curriculum is arranged into four themes:

1. Systems & Resources – topics within this area vary in scale and include: modeling of groundwater, surface water, and air systems; engineered systems such as drinking water distributions systems; and interactions between the environment and urban systems (e.g. stormwater management).
2. Treatment & Sensing Technologies – topics within this area focus on the mitigation and quantification of pollutants loads to the environment, including humans, within all media (air, water, soils).
3. Bio-chemical-physical Processes – topics within this area focus on fundamental process that control the fate and transport of pollutants, including remediation techniques.
4. Environmental Exposure and Risk – topics within this area focus on identifying, quantifying and reducing risk.

Admission Requirements

Admission to this program is contingent upon admission to the Graduate School (http://bulletins.wayne.edu/graduate/general-information/admission/).

The M.S. in Environmental and Sustainability Engineering will admit students with bachelor's degrees or the equivalent in engineering and other qualified science programs if there is a demonstrated aptitude for quantitative analysis. The degree program is suitable for new or recent graduates, as well as experienced professionals. Students will be required to have significant mathematics-based science capabilities. Students should have an overall grade point average (g.p.a.) of 3.2 for regular admission. Qualified or probationary admission may be granted with a lower g.p.a. As noted above, field/professional experience will be viewed positively in the application review process.

Program Requirements

The M.S. in Environmental and Sustainability Engineering requires a minimum of thirty credits under one of two degree plans approved by the James and Patricia Anderson College of Engineering:

Plan A: consists of a minimum of twenty-four credit hours of course-work in combination with a minimum of six credits of thesis.

Plan C: consists of a minimum of thirty credits of course-work.

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

The program is designed to provide graduates a core of systems, treatment, process, and exposure/risk skills in research and applied situations.

Code	Title	Credits
Students must take at least one course from each of the four foundational areas described below. Other courses may satisfy foundational area requirements if approved by Graduate Program Director.		
Water Resources Foundational Area:		
CE 6130	Open Channel Hydraulics	
CE 6150	Hydrologic Analysis and Design	
CE 6190	Groundwater	
Chemistry Foundational Area:		
CE 5220	Environmental Chemistry	
CE 6160	Principles of Atmospheric Chemistry and Applications	
CE 7160	Advanced Principles of Atmospheric Chemistry and Applications	
Biology Foundational Area:		
CE 7280	Applied Environmental Microbiology	
Statistics Foundational Area:		
CE 7070	Risk and Reliability in Civil Engineering	
CE 7080	Advanced Causal Inference for Engineers and Planners	
CE 7270	Big Data Applications in Environmental Engineering	
Other Civil & Environmental Engineering course options include:		
CE 5230	Water Supply and Wastewater Engineering	
CE 5410	Energy, Emissions, Environment (E3) Design	
CE 5510	Geotechnical Engineering I	
CE 5520	Geotechnical Engineering II	
CE 5995	Special Topics in Civil Engineering I	
CE 6170	River Assessment and Restoration I	
CE 6270	Sustainability Assessment and Management	
CE 6580	Geoenvironmental Engineering I	
CE 6910	Pharmaceutical Waste: Environmental Impact and Management	
CE 7170	Advanced River Assessment and Restoration I	
CE 7190	Groundwater Modeling	
CE 7240	Advanced Air Pollution Engineering	
CE 7311	Sustainability of Urban Environmental Systems	
CE 7580	Environmental Remediation	
CE 7990	Directed Study	
CE 7995	Special Topics in Civil Engineering II	
CE 7996	Research	
CE 8999	Master's Thesis Research and Direction	
Students may also take up to 9 credits from electives (as approved by advisor), such as:		
CHE 7200	Advanced Transport Phenomena	
ME 5300	Intermediate Fluid Mechanics	
ME 7310	Computational Fluid Mechanics and Heat Transfer	
IE 6210	Applied Engineering Statistics	
IE 6270	Engineering Experimental Design	
BIO 5100	Aquatic Ecology	
MAT 5070	Elementary Analysis	
MAT 5770	Mathematical Models in Operations Research	
MAT 5870	Methods of Optimization	

The graduation requirement is completion of the M.S. courses with an overall GPA of 3.00 or higher. All core classes in the program must

be completed with a 3.00 score or better. And all course work must be completed in accordance with the regulations of the Graduate School (http://bulletins.wayne.edu/graduate/general-information/academic-regulations/) and the James and Patricia Anderson College of Engineering (http://bulletins.wayne.edu/graduate/college-engineering/academic-regulations/).