WATER SCIENCE AND ENGINEERING

The availability of usable freshwater is a fundamental requirement for drinking water, food production, power generation, and the extraction and processing of natural resources such as oil, gas, and minerals. Global demands for food, energy, and water are expected to rise by 60% by 2050. On a global scale, the availability and access to clean drinking water is the single largest factor affecting human health.

To help prepare students who will address these grand societal challenges, we offer a thesis-based and non-thesis based MS-degree in Water Science and Engineering (WSE). The WSE program integrates the expertise in Civil Engineering, Environmental Engineering, Chemistry, Chemical Engineering, Geology, Geological Engineering, and Biology to provide students with a tailored interdisciplinary experience. Students in the WSE degree program will take courses in the following focus areas (1) Engineering Hydrology, (2) Water Infrastructure and Remediation, (3) Water Resources and the Environment, and (4) Water Policy.

Master of Science
Water Science and Engineering

The Water Science and Engineering (WSE) Master of Science (MS) degree requires a total of 31 graduate credit hours beyond the B.S. degree for both thesis and non-thesis MS options. We encourage applications from students with undergraduate degrees from one of the seven participating programs (Biology, Chemistry, Chemical Engineering, Civil Engineering, Environmental Engineering, Geology and Geophysics, and Geological Engineering) or closely related degree programs. Graduate certificates in *Subsurface Water Resources* and/or *Surface Water Resources* can serve as an entry point into the WSE program.

The thesis option is comprised of the following:

- Program Courses: Students will select six courses (18hrs) from the Program Course List. Students must take at least one course from three different course categories and also take at least one course from three separate departments. Course categories include *Engineering Hydrology, Water Infrastructure and Remediation, Water Resources and the Environment*, and *Water Policy*.
- Additional Courses: Students will select two courses (6 hrs) from a combination of existing and newly developed graduate courses that are relevant to their degree plans. These courses must be approved by their advisor in consultation with their thesis committee and will be chosen based on their specific career goals and interests.
- Graduate Seminar: Students will be required to take one hour of graduate seminar from any of the affiliated disciplines.
- Thesis Research: Students will complete six hours of research credit.

The non-thesis option is identical to the thesis option except that the research hours are replaced with six hours of additional coursework. The non-thesis WSE MS-degree is offered both on campus and online.

Engineering Hydrology		
CIV ENG 6331	Advanced Hydraulics And Hydraulic Engineering	3
CIV ENG 5338	Hydrologic Engineering	3
CIV ENG 5330	Unsteady Flow Hydraulics	3
CIV ENG 5331	Hydraulics Of Open Channels	3
CIV ENG 5333	Intermediate Hydraulic Engineering	3
CIV ENG 5337	River Mechanics And Sediment Transport	3
CIV ENG 6338	Advanced Hydrology	3
GEO ENG 5320	Groundwater Modeling	3
GEO ENG 5331	Subsurface Hydrology	3
GEO ENG 5332	Fundamentals of Groundwater Hydrology	3

Water Infrastructure and Remediation		
CIV ENG 5335	Water Infrastructure Engineering	3
CIV ENG 6340	Urban Hydrology	3
CIV ENG 6335	Hydraulic Structures	3
BIO SCI 6463	Bioremediation	3
CHEM ENG 4210	Biochemical Reactors	3
CHEM ENG 5110	Intermediate Chemical Reactor Design	3
CIV ENG 5332	Transport Processes in Environmental Flows	3
CIV ENG 5360	Water Resources And Wastewater Engineering	3
ENV ENG 5630	Remediation of Contaminated Groundwater And Soil	3
ENV ENG 5635	Phytoremediation and Natural Treatment Systems: Science and Design	3
ENV ENG 5619	Environmental Engineering Design	3
ENV ENG 6612	Biological Operations In Environmental Engineering Systems	3
ENV ENG 6611	Physicochemical Operations In Environmental Engineering Systems	3
GEO ENG 6237	Advanced Geological & Geotechnical Design For Hazardous Waste Mgt	3
GEO ENG 5239	Groundwater Remediation	3
GEO ENG 5381	Intermediate Subsurface Hydrology And Contaminant Transport Mechs	3

Water Resources and the Environment		
BIO SCI 4313	Introduction to Environmental Microbiology	3
BIO SCI 6313	Environmental Microbiology	3
BIO SCI 4383	Toxicology	3
BIO SCI 4363	Freshwater Ecology	3
BIO SCI 6363	Advanced Freshwater Ecology	3
BIO SCI 6383	Advanced Toxicology	3
CHEM ENG 5340	Principles of Environmental Monitoring	3
CHEM 4710	Principles Of Environmental Monitoring	3
CHEM 5710	Environmental Monitoring	3
ENV ENG 5605	Environmental Systems Modeling	3
ENV ENG 5642	Sustainability, Population, Energy, Water, and Materials	3
GEOLOGY 4431	Methods Of Karst Hydrogeology	3
GEOLOGY 4411	Hydrogeology	3
GEOLOGY 4451	Aqueous Geochemistry	3
GEO ENG 5153	Regional Geological Engineering Problems In North America	3

Water Policy		
CIV ENG 5640	Environmental Law And Regulations	3
CIV ENG 5650	Public Health Engineering	3
POL SCI 4500	Geopolitics and International Security	3
POL SCI 4320	Policy for Science, Technology, and Innovation	3
ECON 4440	Environmental And Natural Resource Economics	3

A written thesis and formal thesis defense are required for thesis-based MS-degree students. Entrance requirements are equivalent to the baseline university graduate student admission standards. The GRE exam is not required for internal degree applicants.