

Graduate Programs in ENVIRONMENTAL SCIENCE, ENVIRONMENTAL ENGINEERING AND CIVIL ENGINEERING

INTRODUCTION

The School of Civil Engineering and Environmental Science at the University of Oklahoma has a longstanding tradition of excellence in graduate education in the environmental field and offers degrees at both the Master's and Doctoral levels. This brochure describes the requirements for the following degree programs: Master of Environmental Science, Master of Science in Environmental Engineering, Master of Science in Civil Engineering (programs in water resources engineering and geoenvironmental engineering only) and the doctoral degrees in environmental science, environmental engineering, and civil engineering. The Master of Civil Engineering and doctoral degree programs in structural and geotechnical engineering are described in a separate document.

DEGREE PROGRAMS

Master of Science Degree Programs (MES, MS Env. Engr., and MSCE)

The MES program is open to students with undergraduate degrees in the physical, natural, or life sciences or related disciplines who have completed certain minimum undergraduate coursework. The MS Env. Engr. and MSCE programs are open to students with undergraduate degrees in environmental or civil engineering or related engineering or science disciplines who have completed certain minimum undergraduate coursework. Specific entrance requirements for each degree program are described in the following section, "*Entrance Requirements for the MES, MS Env. Engr., and MSCE Degree Programs*".

Two options, thesis and non-thesis, are available for all Master's degree programs. Both options include a final oral examination and have a minimum residency requirement of one academic year. Each degree program consists of discipline-specific core courses, technical electives and a writing component as outlined in Tables 1-3. As shown in Tables 3a and 3b, there are two environment-related program areas for the MSCE degree: Water Resources Engineering, and Geoenvironmental Engineering, each with different core course requirements.

In some cases, core course requirements for the Master's degree may be satisfied by undergraduate coursework, but courses completed as part of an undergraduate degree program cannot count toward the number of credit hours required for a graduate degree.

Entrance Requirements

MES Program: Admission to the MES program requires an undergraduate degree in environmental science, biology, chemistry, math, physics, geology, meteorology, environmental engineering, chemical engineering or a related discipline and completion of the following courses:

For MES Environmental Quality Track

- Two semesters of calculus (MATH 1823 and MATH 2423, or equivalent¹)
- One semester of physics (PHYS 2414 or equivalent)
- Two semesters of chemistry (CHEM 1415 and CHEM 3053, or equivalent)
- Two semesters of biological sciences (ZOO 1114 or BOT 1114 or BIOL 1134 and/or MBIO 2815, ZOO 3403 or BOT 3453)

For MES Water Resources Track

- Two semesters of calculus (MATH 1823 and MATH 2423, or equivalent)
- Two semesters of physics (PHYS 2414 and PHYS 2424, or equivalent)
- One semester of chemistry (CHEM 1415 or equivalent)
- One semester of biological sciences (ZOO 1114 or BOT 1114 or BIOL 1134 or equivalent)
- One semester of earth sciences (CEES 3213 Water Resource Engineering or GEOL 2014 The Earth System or MET 2013 Meteorology, or equivalent)

Courses not completed prior to admission will be assigned as deficiency courses (see below).

MS Env. Engr: Admission to the MS Env. Engr. program requires an undergraduate degree in a related engineering or science discipline and completion of the following courses:

- Calculus through differential equations (MATH 1823, 2423, 2443, and G3113 or equivalent¹)
- Two semesters of physics (PHYS 2514 and 2524, or PHYS 2414 and 2424, or equivalent)
- At least one semester of introductory college chemistry (CHEM 1415 or equivalent)
- One semester of organic chemistry (CHEM 3053 or equivalent)
- Fluid Mechanics (CEES 2223 or equivalent)
- Statics and Dynamics (CEES 2113 or equivalent)
- Environmental Engineering (CEES 2313, 2323 and 3243 or equivalent)
- Water Resources Engineering (CEES 3213 or equivalent)

Courses not completed prior to admission will be assigned as deficiency courses (see below). Because of diverse student backgrounds, either PHYS 2514 and 2524 or PHYS 2414 and 2424, or equivalent, can be used to satisfy the MSCE admission requirements for physics. If an applicant has not completed the equivalent of either of these two-semester physics sequences, then PHYS 2514 and 2524 will be assigned as deficiency courses.

¹ For all classes listed here, equivalent courses taken at other universities are acceptable. For comparison, the OU course catalog is available online at: <http://www.ou.edu/bulletins/>.

MSCE Programs: Admission to the MSCE programs in Water Resources Engineering and Geoenvironmental Engineering requires an undergraduate degree in a related engineering or science discipline and completion of the following courses:

- Calculus through differential equations (MATH 1823, 2423, 2443, and G3113 or equivalent¹)
- Two semesters of physics (PHYS 2514 and 2524, or PHYS 2414 and 2424, or equivalent)
- At least one semester of introductory college chemistry (CHEM 1415 or equivalent)
- Fluid Mechanics (CEES 2223 or equivalent)
- Statics and Dynamics (CEES 2113 or equivalent)
- For Water Resources Engineering program area only: Water Resources Engineering (CEES 3213 or equivalent)
- For the Geoenvironmental Engineering program area only: Soil Mechanics (CEES 3364 or equivalent)

Courses not completed prior to admission will be assigned as deficiency courses (see below). Because of diverse student backgrounds, either PHYS 2514 and 2524 or PHYS 2414 and 2424, or equivalent, can be used to satisfy the MSCE admission requirements for physics. If an applicant has not completed the equivalent of either of these two-semester physics sequences, then PHYS 2514 and 2524 will be assigned as deficiency courses.

Deficiency Courses: Students who have completed some, but not all, of the entrance requirements for the MES, MS Env. Engr., or MSCE degree programs may be conditionally admitted, with the condition that they successfully complete certain deficiency courses at the beginning of their degree program. Deficiency courses are required in addition to stated program course requirements (Tables 1-3) and do not count toward the master's degree. Before applying to any Master's degree program, prospective students should carefully review the entrance requirements to determine the number of deficiency courses that would be required and to determine which degree program is best for them. If conditionally admitted, it is the responsibility of each student to consult with his or her advisor to determine if he or she has the necessary prerequisite knowledge prior to enrolling in deficiency courses. A letter grade of "B" or better is required for all deficiency courses.

Doctor of Philosophy Degree (Ph.D.)

CEES offers doctoral degrees in environmental science, environmental engineering, and civil engineering. A master's degree in a related discipline is typically required for admission to all CEES Ph.D. degree programs, although students who have outstanding academic credentials and a documented record of research experience at the undergraduate level may occasionally be admitted to the doctoral program without a master's degree. Admission to the doctoral program in environmental engineering or civil engineering also requires at least one degree in engineering, or completion of the entrance requirements for the MS Env. Engr. or MSCE degree program.

In addition to coursework, the doctoral degree program requires completion of research that expands knowledge in the fundamental concepts of environmental science, environmental engineering, or civil engineering. Each doctoral student is therefore expected to produce a research dissertation that describes significant new findings in their field, and that is sufficient in scope to form the basis of three or more papers published in refereed journals. The doctoral degree requires a minimum of 48 hours of post-bachelor's coursework, a minimum of 4 and a maximum of 41 hours of dissertation research, and one hour of technical communications, all

totaling at least 90 post bachelor's hours. Thirty hours of CEES courses and at least 12 hours of courses outside CEES are required. The coursework required for the doctoral program is determined by each student with the approval of their advisor and dissertation committee, and is based on the student's educational background and chosen research program. In addition to their final dissertation defense, all doctoral students are required to participate in a non-credit seminar series and make at least one seminar presentation related to their research during their course of study.

TRANSFER CREDITS

No more than 8 hours of eligible graduate coursework may be transferred from another institution for the master's degree. No more than 30 hours of eligible graduate coursework, including a maximum of 4 hours of master's thesis research, may be transferred from another institution for the doctoral degree.

FINANCIAL ASSISTANCE

CEES currently has funding for several graduate fellowships from the Department of Education's Graduate Assistance in Areas of National Need program for students pursuing doctoral degrees in environmental science or engineering. Each GAANN fellowship includes a competitive stipend, health benefits, tuition waiver and cost-of-education allowance. University of Oklahoma fellowships may also be available for highly qualified students pursuing the doctoral degree. CEES also provides research and teaching assistantships, which include stipends, health benefits and full or partial tuition waivers to qualified graduate students pursuing MES, MS Env. Engr., MSCE and Ph.D. degrees. Research assistants typically write their thesis or dissertation on the subject for which financial support is received. Teaching assistants typically supervise laboratory sections, hold office hours and grade assignments. Master's students receiving financial assistance are almost always those who pursue thesis option degrees. Because students with research and teaching assistantships typically spend 20 or more hours per week on their teaching or research responsibilities, such students may take up to an additional year to complete their master's degree. Students with research and teaching assistantships can enroll for a maximum of 12 credit hours per semester.

Instructor positions are occasionally available for advanced graduate students, particularly those interested in a university teaching career. Graduate students whose native language is not English must first pass an English proficiency exam before being appointed to positions as instructors or as teaching assistants. All applications for financial assistance should be directed to the CEES graduate programs assistant.

CEES FACULTY

Web sites of individual faculty members can be accessed through www.cees.ou.edu.

Elizabeth Butler, Ph.D. (Michigan)—associate professor of Civil Engineering and Environmental Science (abiotic pollutant transformation reactions, natural attenuation, photocatalytic oxidation).

Amy B. Cerato, Ph.D. (Massachusetts)—assistant professor of Civil Engineering and Environmental Science (shallow foundations, strength testing of granular material, clay mineralogy, shrink-swell potential of expansive soils)

Kianoosh Hatami, Ph.D.(McMaster), P.E.—assistant professor of Civil Engineering and Environmental Science (earthquake engineering and structural dynamics, fluid-structure interaction, use of geosynthetics in civil engineering, reinforced soil retaining walls and foundations, numerical modeling)

Yang Hong, Ph.D. (Arizona) – associate professor of Civil Engineering and Environmental Science (environmental remote sensing, radar/satellite precipitation retrieval and evaluation, global hydrology and water resources modeling, geographic information systems, natural hazards prediction and mitigation, and artificial intelligence technology)

Thomas Kang, Ph.D. (California-LA), P.E. – assistant professor of Civil Engineering and Environmental Science (reinforced concrete design, prestressed concrete design, large-scale testing, nonlinear dynamic modeling of structural components and systems. Development of design models and provision)

Tohren Kibbey, Ph.D. (Michigan)—associate professor of Civil Engineering and Environmental Science (behavior of complex chemical mixtures; surface physical chemistry; adsorption).

Robert C. Knox, Ph.D. (Oklahoma), P.E.—director, John A. Myers Professor and Samuel Roberts Noble Presidential Professor of Civil Engineering and Environmental Science (hydrodynamics, subsurface transport and fate processes, surfactant-based subsurface remediation technologies, ground water quality management and pollution control)

Randall L. Kolar, Ph.D. (Notre Dame), P.E.—professor of Civil Engineering and Environmental Science (ground water modeling, shallow water modeling, and numerical algorithms).

Joakim G. Laguros, Ph.D. (Iowa State), P.E. – David Ross Boyd Professor (Emeritus) of Civil Engineering and Environmental Science (highway and roadway construction materials, fly ash usage in construction and highway settlement)

Mark Meo, Ph.D. (California-Davis)—research fellow, Science and Public Policy Program; Professor of Civil Engineering and Environmental Science (environmental policy).

Gerald A. Miller, Ph.D. (Massachusetts-Amherst), P.E.—professor of Civil and Environmental Engineering (static and dynamic behavior of soils, collapsible soils, soil stabilization, in situ and laboratory testing of soils, shallow and deep foundation behavior)

Kyran D. Mish, Ph.D. (California-Davis), P.E. – professor of Civil Engineering and Environmental Science (computational mechanics, computational science, earthquake engineering, visualization, software engineering, bridge engineering, project management, technical administration)

K.K. Muraleetharan, Ph.D. (California-Davis), P.E.—professor of Civil and Environmental Engineering (finite element and constitutive modeling, large displacement/deformation of soils, soil-structure interaction, behavior of partially saturated soils, pollution transport processes through soils, centrifuge modeling, properties of soils at very low effective stresses, and physicochemical behavior of soils)

Robert W. Nairn, Ph.D. (Ohio State)—associate professor of Civil Engineering and Environmental Science (wetlands biogeochemistry and ecology, water quality, ecological engineering)

Mark A. Nanny, Ph.D. (Illinois)—associate professor of Civil Engineering and Environmental Science and Institute for Energy and the Environment (environmental chemistry, NMR, organic geochemistry, petroleum biodegradation, landfill chemistry)

Jin-Song Pei, Ph.D. (Columbia University) – assistant professor of Civil Engineering and Environmental Science (system identification, simulation and control of nonlinear systems; health monitoring and damage detection of large structures; neural networks, wavelets and HHT)

Chris Ramseyer, Ph.D. (Oklahoma), P.E. – assistant professor of Civil Engineering and Environmental Science (metal building and bridge issues; structural stability; application of finite-element analysis and experimental testing techniques to structural systems; improving the reliability and accuracy of steel and concrete design codes and concrete materials.

David A. Sabatini, Ph.D. (Iowa State), P.E.—professor and Sun Oil Company Chair of Civil Engineering and Environmental Science; director, Environmental and Ground Water Institute; associate director, Institute for Applied Surfactant Research (subsurface contaminant transport/remediation, process design for water and wastewater treatment)

Keith A. Strevett, Ph.D. (Connecticut)—professor of Civil Engineering and Environmental Science (surface and ground water quality, development of indicators of water quality deterioration, environmental microbiology, bioremediation)

Baxter E. Vieux, Ph.D. (Michigan State), P.E.—presidential professor of Civil and Environmental Engineering and director, International Center for Hazards and Disaster (surface water quality, geographic information systems, application of spatial analysis techniques to surface and subsurface hydrology, environmental impact assessment, flood forecasting)

Musharraf Zaman, Ph.D. (Arizona), P.E.—associate director Poromechanics Institute, David Ross Boyd Professor of Civil Engineering and Environmental Science (soil dynamics, soil-structure interaction, constitutive modeling, rock mechanics and mining, flow through porous media, numerical and analytical methods, geomechanics)

THE UNIVERSITY OF OKLAHOMA

Created by the Oklahoma Territorial Legislature in 1890, the University of Oklahoma is a doctoral degree-granting research university serving the educational, cultural, economic and health care needs of the state, region and nation. The Norman campus serves as home to all of the university's academic programs except health-related fields. Both the Norman and Health Sciences Center colleges offer programs at the Schusterman Center, the site of OU-Tulsa. The OU Health Sciences Center, which is located in Oklahoma City, is one of only four comprehensive academic health centers in the nation with seven professional colleges. OU enrolls more than 30,000 students, has more than 2,000 full-time faculty members, and has 19 colleges offering 150 majors at the baccalaureate level, 142 majors at the master's level, 76 majors at the doctoral level, 30 majors at the first professional level, and five graduate certificates. The university's annual operating budget is more than \$1 billion. The University of Oklahoma is an equal opportunity institution.

THE COMMUNITY

Norman, Oklahoma is a community of about 95,000 located 18 miles south of Oklahoma City and 190 miles north of Dallas. A variety of recreational, cultural and social activities are available within Norman and in surrounding areas. Lake Thunderbird is ten miles east of Norman and provides an excellent setting for a variety of water activities. Oklahoma City (metropolitan population of approximately 1 million is the largest city in Oklahoma and is the state capital.

APPLICATIONS

For additional information and application materials, visit our Web site at www.cees.ou.edu or our online department application at <http://prewebapps.ou.edu/CEESApp/Default.cfm> .

Return all completed applications to:
Ms. Susan Williams, Graduate Programs Assistant
School of Civil Engineering and Environmental Science
University of Oklahoma
202 West Boyd St., Room 318
Norman, OK 73019-1024

The University of Oklahoma is an Equal Opportunity Institution
Accommodations on the basis of disability are available by contacting Susan Williams
at (405) 325-2344 or FAX (405) 325-4217.

COURSE OFFERINGS

Table 1. MES Degree Requirements

I. MES Thesis Option		
Environmental Quality Track Core Courses (required)		Credit Hours
CEES 5114	Aquatic Chemistry	4
CEES 5324	Environmental Biology and Ecology	4
CEES G4263	Hazardous and Solid Waste Management	3
Approved Environmental Quality Systems course		3-4
One of the following EQ Track systems courses:		
CEES 5244	Water and Waste Treatment	4
CEES 5273	Wetlands Science & Management	3
CEES 5363	Ecological Engineering Science	3
CEES 5833	Ground Water Quality Protection	3
CEES 5863	Environmental Assessment Method	3
Elective Courses Choose from list of MES electives ¹		8-10
Writing and Research		
CEES 5021	Technical Communications	1
CEES 5980 ²	Research for Master's Thesis	5-6
	Total Credits	30 minimum

II. MES Non-Thesis Option		
Environmental Quality Track Core Courses (required)		Credit Hours
CEES 5114	Aquatic Chemistry	4
CEES 5324	Environmental Biology and Ecology	4
CEES G4263	Hazardous and Solid Waste Management	3
Approved Environmental Quality Systems course		3-4
One of the following EQ Track systems courses:		
CEES 5244	Water and Waste Treatment	4
CEES 5273	Wetlands Science & Management	3
CEES 5363	Ecological Engineering Science	3
CEES 5833	Ground Water Quality Protection	3
CEES 5863	Environmental Assessment Method	3
Elective Courses Choose from list of MES electives ¹		14-15
Writing and Special Topics		
CEES 5021	Technical Communications	1
CEES 5020	Special Topics	2
	Total Credits	32

¹ All elective courses are subject to the following restrictions: (i) they must be numbered 5000 or higher, or, for 3000 and 4000 courses, have a "G" preceding the number; (ii) no G3000 courses from CEES may count toward the master's degree; (iii) no more than 9 credits of G4000 courses from CEES, including required core courses, may count toward the master's degree; (iv) no more than 12 credits of G3000 and G4000 courses from all departments, including CEES, may count toward the master's degree; and (v) no more than 9 credits of courses from departments outside CEES may count toward the master's degree.

² While enrolled in CEES 5980, students will participate in a non-credit seminar series. At least once during their course of study, each student will make a seminar presentation related to his or her research.

COURSE OFFERINGS

Table 1. MES Degree Requirements

I. MES Thesis Option		
Water Resources Track Core Courses (required)		Credit Hours
CEES 5843	Hydrology	3
CEES 5853	Groundwater and Seepage	3
CEES G4263	Hazardous and Solid Waste Management	3
Approved Water Resources Systems Course		3-4
One of the following WR Track systems courses:		
CEES 5020	Remote Sensing Hydrology	3
CEES 5363	Ecological Engineering Science	3
CEES 5883	Environmental Modeling	3
CEES 5873	Water Quality Management	3
CEES 5863	Environmental Assessment Method	3
Elective Courses		
Choose from list of MES electives ¹		8-10
Writing and Research		
CEES 5021	Technical Communications	1
CEES 5980 ²	Research for Master's Thesis	5-6
		30 minimum
Total Credits		

II. MES Non-Thesis Option		
Water Resources Track Core Courses (required)		Credit Hours
CEES 5843	Hydrology	3
CEES 5853	Groundwater and Seepage	3
CEES G4263	Hazardous and Solid Waste Management	3
Approved Water Resources Systems Course		3-4
One of the following WR Track systems courses:		
CEES 5020	Remote Sensing Hydrology	3
CEES 5363	Ecological Engineering Science	3
CEES 5883	Environmental Modeling	3
CEES 5873	Water Quality Management	3
CEES 5863	Environmental Assessment Method	3
Elective Courses		
Choose from list of MES electives ¹		14-15
Writing and Special Topics		
CEES 5021	Technical Communications	1
CEES 5020	Special Topics	2
		32
Total Credits		

¹ All elective courses are subject to the following restrictions: (i) they must be numbered 5000 or higher, or, for 3000 and 4000 courses, have a "G" preceding the number; (ii) no G3000 courses from CEES may count toward the master's degree; (iii) no more than 9 credits of G4000 courses from CEES, including required core courses, may count toward the master's degree; (iv) no more than 12 credits of G3000 and G4000 courses from all departments, including CEES, may count toward the master's degree; and (v) no more than 9 credits of courses from departments outside CEES may count toward the master's degree.

² While enrolled in CEES 5980, students will participate in a non-credit seminar series. At least once during their course of study, each student will make a seminar presentation related to his or her research.

List of Possible MES Electives¹:

Course	Title	Credit Hours
CEES G4263	Hazardous and Solid Waste Management	3
CEES G4473	Soil Science	3
CEES 5023	Corporate Environmental Management	3
CEES 5223	Advanced Environmental Chemistry	3
CEES 5253	Environmental Administration and Law	3
CEES 5273	Wetlands Science and Management	3
CEES 5283	Environmental Organic Chemistry	3
CEES 5493	Environmental Evaluation and Management	3
CEES 5653	Industrial Hygiene	3
CEES 5673	Colloid and Surface Science	3
CEES 5913	Risk Assessment and Management	3
CEES 5943	Air Quality Management	3
CEES G4123	Open Channel Flow	3
CEES G4234	Applied Environmental Microbiology	4
CEES 5363	Ecological Engineering Science	3
CEES 5020	Instrumentation for Environmental Chemistry	3
CEES 5244	Water and Waste Treatment	4
CEES 5624	Biological Waste Treatment	4
CEES 5633	Urban Environmental Systems	3
CEES 5823	GIS Applications in Environmental Modeling	3
CEES 5833	Ground Water Quality Protection	3
CEES 5843	Hydrology	3
CEES 5853	Groundwater - Seepage	3
CEES 5873	Water Quality Management	3
CEES 5883	Environmental Modeling	3
BOT 5990	Field Botany	3
BOT 6484	Physiological Plant Ecology	4
BOT/MBIO 5803	Plant Microbe Interactions	3
CHEM 5XXX	Any Course Related to Research	
CHEM 6XXX	Any Course Related to Research	
GEOG 5293	Hydrologic Science	3
GEOG 5453	Geographic Information Systems	3
GEOL 5333	Chemistry of Natural Systems I	3
GEOL 5363	Carbonate Geology	3
GEOL 5743	Organic Geochemistry	3
GEOL 6103	Petroleum Geochemistry	3
MATH G4753	Applied Statistical Methods	3
MBIO 5810	Geomicrobiology	3
MBIO 6873	Microbial Ecology	3
ZOO G4462	Limnology	2
ZOO G4472	Limnology Lab	2
ZOO 5970	Experimental Design in Ecology	3
ZOO 5970	Introduction to Stream Ecology	3

¹ MES students may choose elective courses in civil engineering, environmental science, chemistry, biology, geosciences, policy and law, air pollution, risk assessment and industrial hygiene, hydrology, and/or related subjects. Graduate courses not listed here may also be used as electives with the advisor's prior approval. See other restrictions on elective courses in footnote 1 to Table 1.

Table 2. MS Env. Engr. Degree Requirements

I. MS Env. Engr. Thesis Option		
Core Courses (required)		Credit Hours
CEES 5114	Aquatic Chemistry	4
CEES G4234	Applied Environmental Microbiology	4
CEES 5244	Water and Waste Treatment	4
CEES 5624	Biological Waste Treatment	4
Elective Courses		
Choose from list of MS Env. Engr. and MSCE electives ¹		7-8
Writing and Research		
CEES 5021	Technical Communications	1
CEES 5980 ²	Research for Master's Thesis	5-6
	Total Credits	30 minimum

II. MS Env. Engr. Non-Thesis Option		
Core Courses (required)		Credit Hours
CEES 5114	Aquatic Chemistry	4
CEES G4234	Applied Environmental Microbiology	4
CEES 5244	Water and Waste Treatment	4
CEES 5624	Biological Waste Treatment	4
Elective Courses		
Choose from list of MS Env. Engr. and MSCE electives ¹		13
Writing and Special Topics		
CEES 5021	Technical Communications	1
CEES 5020	Civil Engineering Special Topics	2
	Total Credits	32

¹ All elective courses are subject to the following restrictions: (i) they must be numbered 5000 or higher, or, for 3000 and 4000 courses, have a "G" preceding the number; (ii) no G3000 courses from CEES may count toward the master's degree; (iii) no more than 9 credits of G4000 courses from CEES, including required core courses, may count toward the master's degree; (iv) no more than 12 credits of G3000 and G4000 courses from all departments, including CEES, may count toward the master's degree; and (v) no more than 9 credits of courses from departments outside CEES may count toward the master's degree.

² While enrolled in CEES 5980, students will participate in a non-credit seminar series. At least once during their course of study, each student will make a seminar presentation related to his or her research.

Table 3a. MSCE Degree Requirements—Water Resources Engineering Program Area

I. MSCE Thesis Option—Water Resources Engineering Program Area		
Core Courses (required)		Credit Hours
CEES 5843	Hydrology	3
CEES 5853	Groundwater and Seepage	3
CEES 5873	Water Quality Management	3
CEES 5883	Environmental Modeling	3
Elective Courses		
Choose from list of MS Env. Engr. and MSCE electives ¹		11-12
Writing and Research		
CEES 5021	Technical Communications	1
CEES 5980 ²	Research for Master's Thesis	5-6
	Total Credits	30 minimum

II. MSCE Non-Thesis Option—Water Resources Engineering Program Area		
Core Courses (required)		Credit Hours
CEES 5843	Hydrology	3
CEES 5853	Groundwater and Seepage	3
CEES 5873	Water Quality Management	3
CEES 5883	Environmental Modeling	3
Elective Courses		
C Choose from list of MS Env. Engr. and MSCE electives ¹		17
Writing and Special Topics		
CEES 5021	Technical Communications	1
CEES 5020	Civil Engineering Special Topics	2
	Total Credits	32

¹ All elective courses are subject to the following restrictions: (i) they must be numbered 5000 or higher, or, for 3000 and 4000 courses, have a “G” preceding the number; (ii) no G3000 courses from CEES may count toward the master’s degree; (iii) no more than 9 credits of G4000 courses from CEES, including required core courses, may count toward the master’s degree; (iv) no more than 12 credits of G3000 and G4000 courses from all departments, including CEES, may count toward the master’s degree; and (v) no more than 9 credits of courses from departments outside CEES may count toward the master’s degree.

² While enrolled in CEES 5980, students will participate in a non-credit seminar series. At least once during their course of study, each student will make a seminar presentation related to his or her research.

Table 3b. MSCE Degree Requirements—Geoenvironmental Engineering Program Area

I. MSCE Thesis Option—Geoenvironmental Engineering Program Area		
Core Courses (required)		Credit Hours
CEES G4263	Hazardous and Solid Waste Management	3
CEES 5343	Advanced Soil Mechanics	3
CEES 5423	Environmental Geotechnology	3
CEES 5833	Ground Water Quality Protection	3
Elective Courses		
Choose from list of MS Env. Engr. and MSCE electives ¹		11-12
Writing and Research		
CEES 5021	Technical Communications	1
CEES 5980 ²	Research for Master's Thesis	5-6
	Total Credits	30 minimum

II. MSCE Non-Thesis Option—Geoenvironmental Engineering Program Area		
Core Courses (required)		Credit Hours
CEES G4263	Hazardous and Solid Waste Management	3
CEES 5343	Advanced Soil Mechanics	3
CEES 5423	Environmental Geotechnology	3
CEES 5833	Ground Water Quality Protection	3
Elective Courses		
Choose from list of MS Env. Engr. and MSCE electives ¹		17
Writing and Special Topics		
CEES 5021	Technical Communications	1
CEES 5020	Civil Engineering Special Topics	2
	Total Credits	32

¹ All elective courses are subject to the following restrictions: (i) they must be numbered 5000 or higher, or, for 3000 and 4000 courses, have a “G” preceding the number; (ii) no G3000 courses from CEES may count toward the master’s degree; (iii) no more than 9 credits of G4000 courses from CEES, including required core courses, may count toward the master’s degree; (iv) no more than 12 credits of G3000 and G4000 courses from all departments, including CEES, may count toward the master’s degree; and (v) no more than 9 credits of courses from departments outside CEES may count toward the master’s degree.

List of Possible MS Env. Engr. and MSCE Electives¹:

Course	Title	Credit Hours
CEES 5114	Aquatic Chemistry	4
CEES G4263	Hazardous and Solid Waste Management	3
CEES G4473	Soil Science	3
CEES 5023	Corporate Environmental Management	3
CEES 5223	Advanced Environmental Chemistry	3
CEES 5253	Environmental Administration and Law	3
CEES 5273	Wetlands Science and Management	3
CEES 5283	Environmental Organic Chemistry	3
CEES 5324	Environmental Biology and Ecology	4
CEES 5493	Environmental Evaluation and Management	3
CEES 5653	Industrial Hygiene	3
CEES 5673	Colloid and Surface Science	3
CEES 5913	Risk Assessment and Management	3
CEES 5943	Air Quality Management	3
CEES G4123	Open Channel Flow	3
CEES G4234	Applied Environmental Microbiology	4
CEES 5863	Environmental Assessment Methods	3
CEES 5363	Ecological Engineering Science	3
CEES 5020	Instrumentation for Environmental Chemistry	3
CEES 5244	Water and Waste Treatment	4
CEES 5333	Foundation Engineering	3
CEES 5343	Advanced Soil Mechanics	3
CEES 5423	Environmental Geotechnology	3
CEES 5433	Laboratory In Situ Testing	3
CEES 5624	Biological Waste Treatment	4
CEES 5633	Urban Environmental Systems	3
CEES 5823	GIS Systems in Environmental Modeling	3
CEES 5833	Ground Water Quality Protection	3
CEES 5843	Hydrology	3
CEES 5853	Groundwater and Seepage	3
CEES 5873	Water Quality Management	3
CEES 5883	Environmental Modeling	3
MATH G4753	Applied Statistical Methods	3
MATH 5103	Mathematical Models	3
MATH 5163	Partial Differential Equations	3
MATH 5173	Advanced Numerical Analysis I	3
MATH 5743	Introduction to Mathematical Statistics	3
METR 5344	Computational Fluid Dynamics I	4
CS 5743	Large-Scale Scientific Computing	3

¹ MS Env. Engr. and MSCE students may choose elective courses in civil engineering, environmental science, mathematics, meteorology, computer science, and/or related subjects. Graduate courses not listed here may also be used as electives with the advisor's prior approval. See other restrictions on elective courses in footnote 1 to Tables 2 and 3.