

Master of Science in Environmental Engineering Guidelines for Graduate Students 2019-2020 Edition

Graduate Studies in Environmental Engineering

Welcome to the Master of Science in Environmental Engineering Program (MSEE) at the University of Nebraska. In 1899, the first coursework was offered in what is now called “Environmental Engineering.” The first two classes were “Water Supply for Cities” and “Cleaning and Sewerage for Cities”. Over time, the environmental engineering component of the UNL curriculum has evolved with the environmental field, now with classes in three departments and in five areas of environmental engineering. Since 1995, the Departments of Biological Systems Engineering, Chemical Engineering, and Civil and Environmental Engineering at the University jointly administer a multi-disciplinary program of teaching and research leading to the MSEE. Environmental engineering faculty members in these units offer a balance of expertise covering four major areas of environmental engineering, as sanctioned by the American Academy of Environmental Engineers and Scientists. The field in which students may specialize include: water supply engineering; wastewater engineering; hazardous waste management engineering and solid waste management engineering. In addition, a fifth area in diffuse (non-point) and agricultural waste management engineering is offered.

This program offers a wide variety of activities including a broad array of research and educational opportunities. The interdisciplinary nature of the MSEE program is enhanced by a rich mixture of faculty talent and background. The faculty has a depth and breath of expertise exceeded by relatively few Universities in the U.S. The faculty are proud to have you as part of this program.

Organization of the Handbook

This handbook is intended to introduce potential students to the options and requirements for graduate study in environmental engineering at the University of Nebraska. It should also serve as a reference for current students and faculty advisors. The first part of the handbook contains information on application responsibilities, requirements, procedures, categories of admission, and graduate teaching and research assistantships. Additional information is provided in the Graduate Studies Admissions Guide, published by the Graduate College, and in Departmental Graduate handbooks published by the Departments of Biological Systems Engineering, and Civil and Environmental Engineering. Students are admitted into the MSEE Program and this is where academic and professional advising is conducted. However, depending on the preference and admission requirements, students are typically affiliated with one of the three “home” departments. Therefore, MSEE students are expected to participate in the social and extracurricular programs and to abide by the rules and protocols of the department in which they reside, except as described in this Handbook.

The second part of this handbook presents the general requirements for the completion of the MSEE degree. The general guidelines presented here should aid the student in an orderly, systematic pursuit of the MSEE degree. Students should also consult the Graduate Studies Bulletin where additional details are provided.

Appendix A includes a list of the graduate faculty and a short synopsis of their interests. Take advantage of this list to familiarize yourself with the variety of talent and interests of your faculty. Use this list to contact faculty for advice on projects, thesis topics and so forth. It is your responsibility to contact an advisor and maintain close contact with them during your program of study.

Appendix B contains a list of courses that are considered prerequisites to full admission to the MSEE graduate program. These courses are selected to improve the student's chances of successfully completing the Fundamentals of Engineering examination normally taken by undergraduate engineering students in their final year of study. Appendix C contain a list of courses in various disciplines and a planning guide for scheduling courses. In addition to the principal courses of instruction, a listing of courses that are typically accepted as part of a minor or as electives is included. Planning your curriculum is of great importance to you considering the wide variety of environmentally oriented courses offered at the University of Nebraska.

Student Responsibilities

Remember that the faculty are here to foster learning and to provide the best education for MSEE environmental engineering students that they can possibly offer. However, much of what you learn in your graduate program must be self initiated. Self motivation and commitment to discovery are the essence of graduate study and differentiate most undergraduates from graduate students. Self motivation and commitment also separate superior graduate students from the rest. Ultimately what you learn during graduate study is your responsibility.

Part of the responsibility of the graduate student involves the management of one's own program. Meeting deadlines, following rules, timely submission of forms and so forth are part of the student's responsibility. The University of Nebraska Graduate Studies Bulletin summarizes graduate students' responsibilities with the following statement:

“It is the responsibility of the student to be familiar with the information presented in this bulletin, and to know and observe all regulations and procedures relating to the program he/she is pursuing. In no case will a regulation be waived or an exception granted because a student contends that he/she was not informed of, the regulations or procedures. A student planning to graduate should be familiar with the dates relating to application for graduation and other pertinent deadlines.”

The M.S. Environmental Engineering Student Guidelines handbook is intended to clarify and supplement the Graduate Studies Bulletin so that environmental engineering graduate students have a clear understanding of the admission and operating policies of the program. Your “Home Department” may also have a handbook, procedures manual or policy statement that provides additional detail on the responsibilities of being a graduate student.

Research, Teaching and Technology Transfer Opportunities

The engineering mission at The University of Nebraska involves research, teaching and outreach. The latter is sometimes called extension or technology transfer. MSEE students participate in a wide variety of projects in all areas of the University's mission that are immediately applicable to environmental problems in Nebraska and throughout the world.

Options Within the Master of Science Degree

There are three options for graduate work leading to an MSEE.

Option I is particularly recommended for students interested in research or further graduate study. Students enrolled under the Option I program gain a great deal of experience in project management and in sharpening their communications skills through the process of defining a research problem and completion of a thesis dealing with the problem. A MS thesis is typically an extensive (engineering) research report that in itself constitutes a contribution to the general body of knowledge. A minimum of 30 semester hours of credit consisting of 21 to 24 hours of graduate course credit and 5 to 9 hours of thesis credit are required for Option I students. At least 8 hours of course credits must be earned in courses open exclusively to graduate students (900 level or 800 level without 400 or lower counterparts).

Under **Option II**, a non-thesis program, a student must earn a minimum of 36 semester hours credit in courses representing a major area of study and at least one minor area. At least 12 of the 36 hours must be earned in courses open exclusively to graduate students. If a single minor is selected, the major must include at least 18 hours credit and the minor total at least 9 hours credit. If two minors are selected, the major must include at least 15 hours credit and each minor must represent at least 9 hours of graduate credit. Part-time Option II student with a full-time professional job may take up to 6 credit hours of EnvE 890 (Practicum in Environmental Engineering). Option II is not recommended for students considering further graduate studies. MSEE Option II students must include the equivalent of at least 3 credit hours dealing with a special problem in environmental engineering in which substantial analysis, writing, and oral communication of the results is included.

In special situations **Option III** may be approved. This option permits the substitution of more intensive work in advanced courses for the thesis or minor. The student must earn a minimum of 36 semester hours of credit, at least 18 of which must be earned in courses open exclusively to graduate students. At least 18 hours credit must be in the major. MSEE Option III students must include the equivalent of at least 3 credit hours dealing with a special problem in environmental engineering in which substantial analysis, writing, and oral communication of the results is included.

The option desired must be selected by the student with the approval of his/her major advisor before completion of one half of the graduate program. The student's program progress is monitored by the MSEE Graduate Committee.

Core Course Requirements

All students are required to complete *CE 828 (Environmental Engineering Chemistry, 3 cr)*, *CE 829 (Biological Treatment Processes, 3 cr)* and *CE 823 (Physical/Chemical Treatment Processes, 3 cr)*. All students must also take *ENVE 990 (Seminar in Environmental and Water Resources Engineering, 1 cr)*. Another seminar (i.e. 1 credit) may be required by the student's home department. Students having equivalent courses from a previous degree program may substitute or waive a core course or courses, but only with the express written approval of the MSEE Graduate Committee. MSEE students not having an accredited undergraduate degree in engineering, must complete at least one course, either as a deficiency or at the graduate level, having a substantial design project as the major portion of the course.

Admissions Requirements

To begin candidacy for the masters degree, a student must have completed an ABET accredited undergraduate degree in engineering, or have a B.S. in a physical or biological science and have completed specified deficiency course requirements at the undergraduate level. Graduate students may be admitted in one of the following categories:

Full Graduate Standing Students who have met all requirements for admission and have been accepted by the MSEE Graduate Committee. Graduates of U.S. or Canadian ABET-accredited engineering programs who have maintained a grade point average (GPA) of at least 3.0 (on a 4.0 scale) may be accepted with Full Graduate Standing (Full Status); students whose GPA is 2.75/4.0 or above may be accepted with Provisional Status. In the latter case, recommendation for full status may be made by the MSEE Graduate Committee to the University of Nebraska Graduate College if the student maintains a B average (3.0/4.0) in the first nine semester hours of graduate coursework. Graduates of non-ABET-accredited engineering programs will be reviewed by the MSEE Graduate Committee for possible admission on an individual basis.

Provisional Status Students who show potential for successful graduate work but have deficiencies in prerequisite course work or admission requirements. Students admitted on a provisional basis must be recommended for Full Graduate Standing by the MSEE Graduate Committee and be approved by the Graduate Studies Office before they become degree Candidates.

Applicants with Non Engineering Degrees

Students with a Bachelors of Science degree from a non-engineering program will not be initially admitted with full graduate standing. In general, a cumulative undergraduate GPA of 3.0/4.0 or better is needed for admission on a provisional basis. Full graduate standing can then be achieved by attaining a GPA of 3.0/4.0 or above in a core set of undergraduate engineering, mathematics and science courses, and a cumulative GPA of 3.0/4.0 or above, are required for admission.

Students without equivalent engineering, mathematics and science courses in their undergraduate program must take, for no program credit, a minimum of (i) all mathematics required in the undergraduate engineering programs of the three home departments at The University of Nebraska, (ii) a minimum set of selected courses from a list of approved science and engineering courses plus a course in computer programming and (iii) a minimum set of courses from a list of approved environmental engineering courses. See Appendix B.

Continuance Requirements

1. Students admitted on Full Status must satisfy the scholarship requirements of the Graduate College.
2. Students admitted on Provisional Status must receive a minimum grade of B in each undergraduate deficiency course, a minimum GPA of 3.00/4.00 in the first 9 hours of graduate credit courses and satisfy the scholarship requirements of the Graduate College.
3. Students failing to satisfy these continuance requirements may not continue in the program without permission of the MSEE Graduate Committee.
4. Students have ten years from the time they took the first course listed on the Memorandum of Courses to complete the M.S. After that time, courses taken more than ten years prior are dropped from consideration for the degree.

Graduate Assistantships

Depending on the availability of funds and the qualifications of students, graduate teaching or research assistantships may be awarded to students admitted into the MSEE program on a full-time basis. Every recipient student, whether on a graduate assistantship or not, is required to actively and responsibly participate in the assigned academic programs in environmental engineering, and in their respective resident Department. Those on assistantships will receive formal assignments at the beginning of each semester. Responsibilities may include working on research projects, assisting in proposal and report preparation, assisting in laboratories or grading papers. Whenever possible, the graduate student will be assigned to his/her major advisor.

The Departments of Biological Systems Engineering, Civil and Environmental Engineering, and School of Natural Resources have graduate and research assistantships that may be available to MSEE students. Faculty members may also have funding for assistantships from research projects which would serve as thesis topics and provide student support.

A full graduate assistantship is considered a half-time (20 hours per week) assignment. To receive that level of support, the student must also be enrolled as a full-time student (9 credit hours per semester). Students on partial graduate assistantships are required to enroll for at least 6 credit hours per semester.

Maximum duration of support for full-time students on graduate assistantships for an MSEE degree is normally two academic years (21 months). There may be different levels of financial support for graduate assistantships for MSEE students depending upon their home department and how far along the student is in the MSEE program. A lower level may apply for first year students in a Master of Science degree program. A higher level of support may commence after the student has completed 18 semester hours of course work provided performance is satisfactory. The higher level of support may also be offered to new graduate students already holding a graduate degree.

Summer support will be available on a limited basis for research assistantships. Normally these assistantships will be a continuance of a half-time research assistantship or the student may be switched from a one-half time teaching assistantship to a one-half time research assistantship. The level of the stipends for research and teaching assistantships will normally be dictated by the policies of the home department.

Procedures for the Master of Science Degree

In order for a graduate program to progress smoothly, it is essential that the student follow prescribed procedures. Please visit the Graduate Studies website for more details.

Doctor of Philosophy Degree

Option I is a good preparation for pursuing a Doctor of Philosophy degree (Ph.D.). A Ph.D. is offered in each of the Departments. Students holding an M.S. degree from a recognized engineering school or having completed substantially the requirements for that degree may apply for admission to the Ph.D. program in Engineering. Fields of study include Agricultural and Biological Systems Engineering, and Civil Engineering.

Appendix A

Environmental Engineering Faculty and Research Areas

David Admiraal Associate Professor
UNL - 1999

Ph.D. University of Illinois at Urbana-Champaign Civil Engineering 1999

Dr. Admiraal's primary research interests lie in the areas of water resources engineering, fluvial hydraulics, and sediment transport. He employs experimental and analytical techniques to understand turbulence interactions between water, suspended sediment and other flow constituents. His teaching interests include courses related to hydraulic engineering such as fluid mechanics, hydromechanics, open channel flow, and sediment transport.

Shannon L. Bartelt-Hunt Professor
UNL - 2006

Ph.D. University of Virginia Civil Engineering (Environmental) 2004

Dr. Bartelt-Hunt's research interests are primarily focused on the fate of organic contaminants in soil and groundwater and contaminant fate and transport in landfills. Her teaching interests include solid waste management, environmental chemistry, and physical and chemical transport processes.

Steve Comfort Professor
UNL- 1992

Ph.D. University of Wisconsin Soil Chemistry 1988

Research emphasis on adsorption, degradation and transport of organic compounds in soils. Current research has focused on the remediation of pesticide and munitions contaminated water and soil. Interests include using both microbial and abiotic oxidative and reduction techniques to promote xenobiotic destruction or binding to soil organic matter. Past research experiences include: chemical nonequilibrium transport of pesticides, field validation of solute transport models and modeling solute sorption characteristics.

Bruce I. Dvorak Professor
UNL - 1994

Ph.D. University of Texas at Austin Civil/Environmental Engineering 1994

Dr. Dvorak's research interests include physical/chemical treatment processes, urban storm water management, and pollution prevention/industrial environmental sustainability. His teaching interests include drinking water treatment, physical/chemical treatment processes, environmental sustainability, and process laboratory courses. Dr. Dvorak is active in many professional organizations, including the American Water Works Association.

Jongwan Eun Assistant Professor
UNL - 2016

Ph.D. University of Wisconsin-Madison Civil and Environmental Engineering 2014

Dr. Eun's research interest is focused on waste containment system, mass transport phenomenon through porous and non-porous medium, reuse of industrial byproduct, radioactive material disposal, and advance application of geosynthetics. Dr. Eun is a member of three technical committees (geoenvironmental engineering, geosynthetics, and unsaturated soil mechanics) of Geo-Institute, ASCE and Solid Waste Association of North America (SWANA).

John E. Gilley Adjunct Professor
UNL - 1983

Ph.D. Colorado State University Agricultural Engineering 1982

Dr. Gilley is employed with the USDA-Agricultural Research Service as a member of the Soil and Water Conservation Research Unit. His research interests include animal manure management, soil and water conservation engineering, and surface hydrology and water quality. Currently, he is working to determine the relationship between nutrients in soil and the movement of nutrients to surface water, develop predictive tools to identify areas susceptible to nutrient losses in a landscape, and develop comprehensive watershed-scale nutrient management practices to protect water quality.

Troy Gilmore

Assistant Professor

UNL- 2015

Ph.D. North Carolina State

Biological and Agricultural Engineering 2015

Dr. Gilmore's research emphasis is on groundwater hydrology and groundwater-surface water interactions. Current research is focused on groundwater nitrate, groundwater age (<https://go.unl.edu/gwage>) and aquifer impacts on stream water quality. His work with Nebraska Extension is focused on groundwater and watershed science education for adult audiences.

Junke (Drinker) Guo

Associate Professor

UNL - 2005

Ph.D. Colorado State University

Civil/Hydraulic Engineering 1998

Dr. Guo's research interests have centered on the application of fluid mechanics principles to water resources and environmental processes. These include open-channel flow, turbulent mixing in environmental flow, erosion and sedimentation, wave-current interaction, as well as water quality modeling in rivers, reservoirs and coastal waters. His teaching interests include fluid mechanics, flow systems design, open-channel hydraulics, and sediment transport.

Derek M. Heeren

Assistant Professor

UNL – 2012

Ph.D. Oklahoma State University

Biosystems Engineering 2012

Dr. Heeren's primary research interests are in variable rate irrigation, deficit irrigation strategies, solute fate and transport in soil and shallow aquifers, and international irrigation development. His teaching interests include soil conservation and watershed management, advanced irrigation management, and vadose zone modeling.

George Hunt

Assistant Professor of Practice

UNL – 2012

Ph.D. University of Virginia

Civil Engineering 2005

Dr. Hunt's area of consulting experience included hydrologic and hydraulic modeling, water quality modeling, and watershed management. His teaching includes water resources classes, professional practice, and senior design. Dr. Hunt is active in professional organizations, including the Water Environment Federation.

Xu Li

Associate Professor

UNL – 2009

Ph.D. University of Michigan

Environmental Engineering 2008

Xu Li's research interests focus on three principal areas: 1) fate and transport of contaminants of emerging concerns (e.g., hormones, antimicrobials, and antimicrobial resistance genes) in the environment; 2) environmental biotechnology to remove contaminants (e.g., estrogens, perchlorate, and nitrate) from water; and 3) microbial transformation of soil organic carbon in heterogeneous landscapes. He teaches Introduction to Environmental Engineering, Process Design in Water Supply and Wastewater Treatment, Environmental Engineering Chemistry, and Environmental Engineering Microbiology.

Yusong Li

Associate Professor

UNL – 2008

Ph.D. Vanderbilt University

Environmental Engineering 2005

Dr. Yusong Li's primary research interests include fate and transport of contaminants in the subsurface, environmental implication of engineered nanomaterials, groundwater remediation, and numerical modeling of multiphase flow and reactive transport. Her teaching interests include introduction to water resources engineering, computational problem solving in civil engineering, and introduction to groundwater remediation.

Ayse Kilic Professor
 UNL - 2004
 Ph.D. University of Florida Agricultural and Biological Engineering 2002
 Dr. Kilic's research interests include satellite-based determination of water consumption from vegetation to improve management of ground-water and surface water systems. She is a co-leader for the development of the Google EEFlux version of METRIC and leader for Google GEARUP App for mapping and conserving water in residential and agricultural landscapes on the Google Earth Engine. Dr. Kilic teaching interest include courses in Surface Hydrology, Geographical Information Systems in Water Resources, Remote Sensing, and Natural Resources. Ayse was a member of the national Landsat Science Team from 2012-2017 and is a current member of the NASA ECOSTRESS Science Team for the International Space Station.

Adam J. Liska Associate Professor
 UNL – 2009
 Ph.D. Max Planck Institute/TU Dresden Biology 2003
 Dr. Liska's research is in life cycle assessment of greenhouse gas emissions from the production of biofuels, livestock, and other agricultural products. Current research activities include state-level greenhouse gas emissions inventories, agricultural dynamics from climate change, and the thermodynamics of livestock systems. He teaches introduction to energy science and senior energy seminar, and is program coordinator for the Energy Science Minor. Previous Environmental Engineering MS students include M. Pelton (2013) and X. Fang (2012).

Tiffany L. Messer Assistant Professor
 UNL – 2017
 Ph.D. North Carolina State University Biological and Agricultural Engineering 2015
 Dr. Messer's research and teaching program is centered around the intersection of agricultural engineering, ecology, and chemistry of contaminants. Her program focuses on 1. Fate and transport of emerging contaminants and nutrients in surface waters, 2. Innovative sensor technologies for water quality monitoring, and 3. Ecosystem based Best Management Practices. She teaches Wetlands (BSEN 458/858), Vadose Zone (AGEN/BSEN 957), and Biological System Engineering Graduate Seminar (AGEN/BSEN 889).

Aaron R. Mittelstet Assistant Professor
 UNL - 2016
 Ph.D. Oklahoma State University Biosystems Engineering 2015
 Dr. Mittelstet's research interests include watershed management and modeling, water quality and streambank erosion. His teaching interests include soil and water conservation and watershed modeling. Dr. Mittelstet is active in many professional organizations, including the American Society of Agricultural and Biological Engineers.

Grace Panther Assistant Professor
 UNL - 2019
 Ph.D. Oregon State University Environmental Engineering 2017
 Dr. Panther's research interests are focused in engineering education and include 3-D spatial skills in K-12 settings and university engineering students, gender and teamwork, and better understanding the knowledge domains of practicing engineers relative to engineering students. Dr. Panther is active in many professional organizations both national and international, including the American Society for Engineering Education, the European Society for Engineering Education, and the Australasian Association for Engineering Education.

Amy Millmier Schmidt Associate Professor
 UNL – 2012
 Ph.D. Mississippi State University Biological Engineering 2010
 Dr. Schmidt conducts research and extension activities related to livestock manure management with a primary research interest in fate and transport of environmental contaminants. Her goal is to identify manure and land management practices that can improve the environmental, social, and economic sustainability of livestock production systems. Dr. Schmidt is active in the American Society of Agricultural and Biological Engineers, serves on two National Pork Board committees, and supports youth education about agriculture and the environment through various mentoring activities.

Wayne E. Woldt

Associate Professor

UNL – 1991

Ph.D. University of Nebraska-Lincoln

Civil Engineering 1990

Dr. Woldt's research interests include deployment of unmanned aircraft for next generation sensing of environmental contamination, with a focus on fugitive emissions and transport/fate of air and water contamination, along with site assessment in remediation planning. His teaching interests include unmanned aircraft systems, advanced sensor systems, and interpretation of data for source identification and characterization.

Tian C. Zhang

Professor

UNL - 1995

Ph.D. University of Cincinnati

Environmental Engineering 1994

Dr. Zhang's teaching interests include physical, chemical and biological water and wastewater treatment processes, aquatic chemistry, and remediation of hazardous wastes. His general research interests are water and wastewater treatment, remediation of hazardous substances, and pollution control. The specific research interests are non-point source pollution control technologies and effects of microscale environmental conditions on transport and transformation processes in contaminated soils.

Appendix B

Prerequisite Course Requirements for Entry into the MSEE Program

Students without equivalent courses in their undergraduate program or equivalent job experience must take as a minimum, for no program credit all the mathematics required in the undergraduate engineering programs of the home departments, and a minimum set of science and engineering courses. Course deficiencies are normally listed in the acceptance letter, and may include one or more courses from the following list:

Mathematics *Engineering mathematics through differential equations*

Science and Engineering Courses:

12 hours of Chemistry, Physics or Geology including:

- PHYS 211 (General Physics)
- CHEM 110, 111 or 113 (General Chemistry)

3 hours of Computer Programming:

- CHME 112 or BSEN 112/130 or CSCE 150 or CSCE 155

12 hours of Engineering Science:

- ENGM 223 Statics
- ENGM 373 Engineering Dynamics, or ENGM 325 Strength of Materials or CHME 332 Transport Operations I
- CIVE 310 Fluid Mechanics or CHME 332 Transport Operations II
- PHYS 212 or ELEC 211 or 213 Electrical Circuits or MECH 200 or CHME 322 Thermodynamics

10 Hours of Environmental Engineering and Design Related Courses:

- CIVE/BSEN 326 Introduction to Environmental Engineering *and*
 - CIVE/BSEN 327 Environmental Engineering Laboratory
- and either*
- CIVE 352 Introduction to Water Resource Engr. *or* BSEN 350 Soil and Water Resources Engr.

and one of the following:

- CIVE 419 Flow System Design *or*
- CHME 453 Chemical Engineering Process Design *or*
- CIVE 425 Environmental Engineering Process Design.

In addition to the prerequisite requirements, all students are encouraged to complete the Fundamentals of Engineering (FE) Examination prior to completion of their program of study. The Fundamentals of Engineering Examination constitutes the first step in the licensing process as professional engineers.

Students that have not earned an ABET-accredited undergraduate engineering degree and who earn a graduate degree in Engineering can apply to NCEES to have their undergraduate and graduate coursework evaluated to determine if it meets their minimum standards. Between the undergraduate and graduate coursework, students must demonstrate that they have completed 32 college semester credit hours of higher mathematics and basic sciences, 12 college semester credit hours in general education, and 48 college semester credit hours of engineering science and/or engineering design courses (typically with a limit of 6 hours of special topic and thesis hours). More information on the NCEES Engineering Education Standard is available at:

<https://ncees.org/engineering/ncees-engineering-education-standard/>

Information on this exam should be obtained from the Nebraska State Board of Examiners for Professional Engineers and Architects; 301 Centennial Mall South; Lincoln NE 68509; Telephone: 402-471-2021.

Appendix C

List of Courses

All students are required to complete *CE 828 (Environmental Engineering Chemistry, 3 cr)*, *CE 829 (Biological Treatment Processes, 3 cr)* and *CE 823 (Physical/Chemical Treatment Processes, 3 cr)*. All students must also take *ENVE 990 (Seminar in Environmental and Water Resource Engineering, 1 cr)*. Another seminar (i.e. 1 credit) may be required by the student's home department. Other ENVE courses available with approval are:

ENVE 890. Practicum in Environmental Engineering (1-6 cr) Prereq: Permission. Solution of engineering or management problems through a non-academic experience within the private sector or a government agency. The experience entails all or some of the following: research, design, analysis, and testing on an engineering problem. A plan, which documents how the individual will demonstrate creativity during the practicum must be approved in advance. Students required to write an practicum report of their creative accomplishments after completion of the work experience. EnvE 890 is limited to Option II students who are pursuing the degree on a part-time basis while working a full-time professional job.

ENVE 898. Special Topics in Environmental Engineering (1-6 cr) Prereq: Permission.
Special research-oriented problems in current topics in environmental engineering.

ENVE 899. Masters Thesis (6-10 cr)

ENVE 998. Special Topics in Environmental Engineering (1-6 cr) Prereq: Permission
Independent library and/or experimental research, analysis, evaluation and presentation of current and advanced topics in environmental engineering and closely related areas.

The courses listed below are offered by the participating and other departments and may with approval be a part of your graduate program. There are also many courses not shown here that may be very good electives for your graduate program.

Offered in the Department of Biological Systems Engineering

AGEN 853 Irrigation and Drainage Systems Engineering

AGEN 856 Engineering Analysis of Irrigation Systems

AGEN 953 Advanced Irrigation and Drainage Systems Engineering

AGEN 954 Hydrologic Modeling of Small Watersheds

BSEN 858 Wetlands

BSEN 855 Nonpoint Source Pollution Control Engineering (cross-listed as CIVE 855)

BSEN 841 Animal Waste Management

Offered in the Department of Chemical Engineering

CHME 832 Transport Operations I

CHME 833 Transport Operations II

CHME 835 Transport Phenomena

CHME 842 Chemical Reactor Engineering and Design

CHME 873 Biochemical Engineering

CHME 889 Air Pollution Assessment and Control

Offered in the Department of Civil Engineering

CIVE 821 Hazardous Waste Management
CIVE 822 Pollution Prevention
CIVE 823 Physical/Chemical Treatment Processes
CIVE 824 Solid Waste Management Engineering
CIVE 826 Design of Water Treatment Facilities
CIVE 827 Design of Wastewater Treatment and Disposal Facilities
CIVE 828 Applications of Chemistry to Environmental Engineering
CIVE 829 Biological Wastewater Treatment
CIVE 830 Fundamentals of Water Quality Modeling
CIVE 852 Water Resources Development (Hydrology)
CIVE 853 GIS in Water Resources
CIVE 854 Hydraulic Engineering
CIVE 855 Nonpoint Source Pollution Control Engineering (cross-listed as BSEN 855)
CIVE 856 Surface Water Hydrology
CIVE 858 Groundwater Engineering
CIVE 916 Engineering Economics and Legal Aspects of Water Resources Systems.
CIVE 954 Advanced Hydraulics

Offered in Other Departments

AGRO 955 Solute Movement in Soils (cross-listed as AGEN 955 and CIVE 955)
CRPL 870 Environmental Planning and Policy
GEOL 888 Groundwater Geology
GEOL 986 Contaminant Hydrogeology
NRES 851 Soil Environmental Chemistry (cross-listed as EnvE 851)
NRES 875 Water Quality Strategies (cross-listed as CIVE 875)
STAT 801 Statistical Methods in Research
STAT 802 Experimental Design