

**Master of Science in  
Environmental Engineering  
Guidelines for Graduate Students  
2006-2007 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 Engineering at the University jointly administer a multi-disciplinary program of teaching and research leading to the MSEE. Environmental engineering faculty members in the three departments offer a balance of expertise covering four major areas of environmental engineering, as sanctioned by the American Academy of Environmental Engineers. 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, Civil Engineering and Chemical 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. If you do not have an advisor upon entry into the M.S. program this list can serve as an excellent resource for you. 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. Appendices C - F contain suggestions on selecting an advisor, copies of important forms, and materials from the 'Graduate Studies Administration Guide' to familiarize you with typical Masters Degree deadlines, thesis styles, oral examination and thesis requirements. It is the responsibility of the student to have these forms filled out properly and on time. Appendices C - F 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. Relevant information may also be found in the UNL Graduate Council 1994 'Policy Statement on Rights, Privileges and Responsibilities of Graduate Assistants and Fellowship Recipients'. 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.

On going projects include development of drinking water, wastewater, and contaminated groundwater treatment processes; pollution prevention technologies; multiple criterion decision-making and fuzzy logic; hazardous-waste management and remediation, agricultural waste management; and non-point source pollution control. Environmental engineering projects receive support from The University of Nebraska's Water Center, the Nebraska Research Initiative and Center for Infrastructure Research, the College of Engineering and Technology, the Institute for Agriculture and Natural Resources, and from many industrial organizations, government agencies and private foundations. Much of this support is used to provide graduate assistantships, fellowships and scholarships.

## **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 20 to 24 hours of graduate course credit and 6 to 10 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. 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. Presentations and papers in these seminars must not be duplicative. 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.

*Unclassified Status* Students who satisfy minimum admission requirements and desire to complete some course work without reference to a degree. Students with Unclassified Status are considered to be candidates for an advanced degree. However, unclassified students can take a maximum of 9 graduate credit hours in environmental engineering before approval for further coursework must be granted by the MSEE Graduate Committee. This admission category is not available to international students unless that student is affiliated with a University of Nebraska student exchange program. Unclassified students are not eligible for financial aid, graduate research or teaching appointments (GRA or TA).

The University of Nebraska does not discriminate in its academic admissions or employment programs and abides by all Federal regulations pertaining to same.

### **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.

### **International Applicants**

International applicants who have not graduated from an ABET or CAB accredited undergraduate engineering program in the United States or Canada must take the TOEFL and the verbal and quantitative sections of the Graduate Record Exam (GRE). Those international applicants must achieve a TOEFL score of 550 and a minimum equivalent ranking of 75 percent on the quantitative portion of the GRE examination. These scores must be directly reported to the University of Nebraska Graduate Admissions Office. Graduates of foreign environmental engineering programs who have met the above conditions and who are in the top five percent of their graduating class or

equivalent standing from an environmental engineering program comparable to accredited (ABET) programs may be admitted with full status. Students in the upper 20 percent of their graduating class or equivalent standing from a recognized environmental engineering program may be admitted with provisional status. Students will be recommended for full status after removing all specified undergraduate deficiencies and maintaining at least a B average (3.00/4.00) in the first nine hours of graduate coursework.

Exceptions may be made to these guidelines at the discretion of the MSEE Graduate Committee.

### **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.

### **Application Procedures & Requirements**

Application materials may be obtained from the Office of Graduate Studies, 301 Administration Building, University of Nebraska-Lincoln, Lincoln, NE 68588-0434. [Tel. (402) 472-2875; Fax (402) 472-3834].

The completed form, application fee (non-refundable), and two official copies of all college or university transcripts should be returned to the Office of Graduate Studies. Three letters of recommendation should be forwarded directly to the Director of the MSEE Graduate Program.

All material pertaining to the application must be received before the application will be reviewed. Applicants from the United States should submit all materials at least three months prior to the expected starting date of the graduate program. Due to delays in mailings, processing of visa materials, etc., applicants from outside the United States should start the application process approximately one year prior to the desired initial enrollment period. For these students, all material must be on file by May 1 for the Fall (August) semester and by October 1 for the Spring (January) semester.

Transcripts and all other material submitted in support of an application becomes the permanent property of the Office of Graduate Studies and will not be returned.

## **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 Engineering and Chemical Engineering 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 (18 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. A chronological checklist of these requirements is summarized in Appendix C of this handbook. For additional information please refer to the Graduate Studies Bulletin.

Upon arrival on campus (Lincoln or Omaha) after acceptance into the program, students must consult with the Director (or his/her designee) of the MSEE Graduate Program. At this time, the student will be assigned a temporary advisor in the indicated field of interest. The advisor will assist in course selection for the initial semester as well as subsequent semesters.

During the first six weeks, the student must select, with the consent of the faculty member involved, a major advisor. Students may also be assigned to a major advisor by the MSEE Program Director. A change in the major advisor can be made up to the time of filing the Memorandum of Courses form with the Graduate College. However, the MSEE Graduate Director must be advised of a change in advisor. The major advisor provides guidance in selecting the academic course of study, serves as an intermediary between the student and the Graduate College, works closely with the student in carrying out a thesis project under Option 1, and provides general guidance throughout the graduate program.

At the beginning of a graduate program, a Tentative Program of Study is prepared by the student with the assistance of the major advisor (see Appendix E). This outline includes proposed courses and area of research (Option I). This form must be completed and approved by the end of the first semester on campus. The form is available from the departmental offices.

The Memorandum of Courses (see Appendix F) must be filed with the Graduate College before the student has received grades in approximately one-half of the prescribed graduate program. At this time, the option selected for the graduate program and associated courses are designated. After approval by the Graduate College, students cannot change options. The student has six calendar years to complete the M.S. from the date of the first course on the Memorandum of Courses.

Two seminars may be required. All MSEE graduate students are required to register at least once (ENVE 990) and attend all seminars in Environmental Engineering during their graduate program. In addition, each student must present at least one seminar related to his/her program of study. A second seminar, in the home department, may also be required. The requirements for departmental seminars will vary depending on the department.

Comprehensive written and/or oral examinations are required at the conclusion of the graduate program. For students under Option I, an oral presentation and defense of the thesis project before the supervisory committee is required. For students enrolled under Option II, a written *and/or* oral final exams are generally required and the choice is left to the student's supervisory committee. The supervisory committee consists of at least three faculty members including the major advisor. At least one committee member must be a Graduate Faculty Fellow and one member must be from outside the student's major area of graduate study. The committee is responsible for approving the final program of study and examinations. Therefore, it is essential that this committee be formed prior to completion of one-half of the graduate program and be supportive of the research topic selected.

An Application for Advanced Degree form must be filed with the Records Office at the beginning of the semester or summer session in which the student plans to graduate. Failure to file this form on time will delay graduation. Deadline dates are posted in the Departments and at the Office of Graduate Studies.

A Final Examination Report form must be filed with the Office of Graduate Studies at least four weeks prior to the final examination and filing of the final report for the degree. At this time, compliance with the indicated graduate program as outlined in the Memorandum of Courses is verified and checks are made for incomplete, etc.

Two copies of the thesis prepared under Option I must be presented to the Examining Committee at least two weeks prior to the oral examination. Copies of the completed thesis must also be provided to members of the examining committee. After the final examination has been completed and any necessary changes have been made in the thesis, two copies of the thesis in proper form are deposited with the Dean of University Libraries. Certificates of deposit signed by the examining committee and the Dean of University Libraries are delivered to the Office of Graduate Studies.

If a graduate student under the thesis option (Option I) fails the final oral examination, another examination cannot be scheduled until the following semester or summer session. Likewise, a student who performs poorly in a final comprehensive exam under the non-thesis option can be required to retake the examination. Failure of a second examination indicates the student has inadequate understanding of the material and he/she will be dropped from the graduate program.

### **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 through a unified program of the College of Engineering and Technology. 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, Chemical 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.

#### **Istvan Bogardi**

Professor

UNL - 1985

Ph.D. Technical University of Budapest

Irrigation Engineering 1965

Dr. Bogardi is recognized internationally for his work on engineering systems analysis. His areas of expertise include risk and reliability analysis, and multicriteria decision making applied to water resources and environmental systems. Bogardi is actively involved in cooperative research with scientists in Austria, Greece, Russia, Germany, France, Sweden and Hungary. Bogardi was the Director of a NATO Advanced Research Workshop of Nitrate Contamination in 1990. He is a consultant with UNESCO on the conflict between development and environment. He has received research support from, among others, NSF, EPA, the U.S. Army Corps of Engineers, USGS, IDOE, USDA, and NATO.

#### **Shannon L. Bartelt-Hunt**

Assistant Professor

UNL-2006

Ph.D. University of Virginia

Civil Engineering (Environmental) 2004

Dr. Bartelt-Hunt's research interest are focused in the area of geo-environmental engineering. She utilizes both experimental research and mathematical modeling to investigate contaminant fate and transport in soil and groundwater, contaminant fate and transport in landfills, and the design of remediation strategies for hazardous waste sites. 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.

#### **Mohamed Dahab**

Professor

UNL - 1983

Ph.D. Iowa State University

Environmental Engineering 1982

Dr. Dahab's research interests include the use of biological systems for water purification and wastewater treatment, nutrient removal from wastewater, and the use of constructed wetlands for wastewater treatment. He has completed numerous research and technology transfer projects in the areas of solid and hazardous waste management engineering with emphasis on pollution prevention and minimization; development of risk-based solutions for the prevention and control of groundwater contamination; and water purification and wastewater treatment systems. Dr. Dahab collaborates with researchers throughout the world including Austria, Brazil, Canada, Egypt, Germany, Hungary, Korea, and Spain. Dr. Dahab is active in numerous professional organizations, including the Water Environment Federation where he is currently serving as President-Elect (2006).

**Bruce I. Dvorak**

Associate Professor

UNL - 1994

Ph.D. University of Texas at Austin

Civil/Environmental Engineering 1994

Dr. Dvorak's research interests include physical/chemical treatment processes and pollution prevention. He is interested in experimental verification and modeling of mass transfer in physical/chemical processes (such as carbon adsorption), mathematical modeling of treatment process performance and cost, and the modeling of imprecision in treatment processes and pollution prevention assessments. His teaching interests include drinking water treatment, physical/chemical treatment processes, and process laboratory courses. Dr. Dvorak is active in many professional organizations, including the American Water Works Association where he is serving as the Secretary of the Nebraska Section, and the Chair of the National Small Systems Research Committee.

**Dean E. Eisenhauer**

Professor

UNL - 1975

Ph.D. Colorado State University

Hydrologic Engineering 1984

Dr. Dean Eisenhauer's research expertise is in hydrologic and irrigation engineering. Dr. Eisenhauer's research interests in hydrologic engineering include the impacts of land and water use practices on the components of the hydrologic cycle, on chemical transport, and on the hydrology of agricultural watersheds. Infiltration and overland runoff are studied in both agricultural and natural ecosystems. Engineering of vegetative buffers for riparian and upland ecosystems is one of his current research areas. In irrigation, Dr. Eisenhauer is working on water flow measurement systems for shallow streams and irrigation pipelines. Dean Eisenhauer teaches courses in hydrology, hydrologic modeling, irrigation management, and watershed management.

**Thomas G. Franti**

Associate Professor

UNL - 1993

Ph.D. Purdue University

Agricultural Engineering 1987

Dr. Franti's research interests include the study of the fate and transport of surface water contaminants, with particular emphasis on agricultural nonpoint source pollution and best management practices to reduce contaminant transport to surface water. Dr. Franti has research projects related to evaluating grass filter strips and developing a runoff simulator to do field assessment of soil and water conservation practices. Dr. Franti assists teaching in the Biological Systems Engineering senior design course and teaches a graduate course in Ecological Systems Engineering.

**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.

**Junke (Drinker) Guo**

Assistant 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.

**F. Edwin Harvey**

Assistant Professor

UNL - 1996

Ph.D. University of Waterloo (Canada)

Hydrogeology 1996

Dr. Harvey's research interests are in the use of water chemistry and stable, radioactive and radiogenic isotopes to examine regional scale groundwater flow systems, ecosystem hydrology, groundwater-surface water interaction, paleohydrology, and contaminant migration. Dr. Harvey teaches courses in isotope hydrology, watershed hydrology, wetland hydrology, groundwater contamination and remediation, and laboratory and field methods in hydrogeology and water chemistry.

**James L. Hendrix**

Professor

UNL - 1995

Ph.D. University of Nebraska

Chemical Engineering 1969

For the past 20 years Jim Hendrix has had an active research program associated with environmental problems related to the minerals industry. He has also taught several courses related to environmental engineering at both the undergraduate and graduate levels. His specific research interests include the treatment of tailings dams and heaps as chemical reactors. Dr. Hendrix is an international leader in sustainable development issues associated with mining.

**Erkan Istanbuluoglu**

Assistant Professor

UNL-2005

Ph.D. Utah State University

Civil and Environmental Engineering 2003

Dr. Istanbuluoglu's research interests lie in various aspects of hydrological sciences, more specifically surface hydrology, ecohydrology, and earth surface processes including hillslope erosion, sediment transport and landform development. He uses and develops numerical models to investigate the effects of changes in the environment and climate on water resources, sediment yields and landscape response. He teaches courses related to surface hydrology, surficial processes, geomorphology and landscape evolution.

**Richard K. Koelsch**

Associate Professor

UNL - 1992

Ph.D. Cornell University

Agricultural &amp; Biological Engineering 1994

Rick Koelsch provides leadership for an extension program addressing livestock environmental issues. Current extension program focus is being placed on development of a national learning center addressing livestock environmental issues targeting livestock producers and advisors, assembly of a consensus Comprehensive Nutrient Management Planning process for Nebraska, and implementation of educational programs related to nutrient management and odor control in livestock. His research interests include nutrient flows on livestock systems and control of volatile emissions from livestock facilities. His position at UNL is a joint appointment between Biological Systems Engineering and Animal Science Departments.

**Dennis D. Schulte**

Professor

UNL - 1978

Ph.D. Cornell University

Waste Management 1975

Dennis Schulte teaches graduate and undergraduate courses in introductory environmental engineering, nonpoint source pollution control, agricultural waste management, and introductory biological systems engineering. His research interests include air pollution impacts of agricultural operations and phosphorus management for nonpoint source pollution control. He has received several college and national teaching awards.

**Patrick J. Shea**

Professor

UNL - 1981

Ph.D. North Carolina State University

Crop/Soil Science 1981

Research activities and interests include mechanisms of sorption, transformation, transport, availability, toxicity, and detoxification of xenobiotic (biologically foreign) organic compounds in the environment, as well as pollution prevention, environmental and agricultural management, and the remediation and restoration of contaminated soil and water. Teaching

includes Xenobiotics in the Environment, participation in Advanced Toxicology (UNMC), and various special topics courses. Dr. Shea's home department is the School of Natural Resources.

**Joseph Skopp** Associate Professor  
UNL - 1980  
Ph.D. University of Wisconsin Soil Physics 1980

Joseph Skopp teaches graduate and undergraduate classes in Soil Physics, Determination of Soil Physical Properties, Soil and Water Quality, and Solute Transport in Soils. His research interests include movement of solutes in soils, including both nutrient uptake modeling and contaminant transport to groundwater. Related research interests include the determination of soil physical properties relevant to solute transport, including unsaturated hydraulic conductivity. This research is primarily theoretical although experimental work is conducted as needed to validate models.

**John S. Stansbury** Associate Professor  
UNL - 1995  
Ph.D. University of Nebraska Environmental Engineering 1991

Dr. Stansbury's teaching interests include water resources, hazardous waste management and remediation, risk assessment, and risk management. His research interests include application of risk assessment and risk management methods to water resources planning, hazardous waste management, and to other engineering areas. Other research interests include remediation methods for hazardous waste sites, contaminated sediments and water, pollution prevention, and innovative treatment methods for point and nonpoint source pollution.

**Rick Stowell** Assistant Professor  
UNL - 2001  
Ph.D. Michigan State University Agricultural Engineering 1997

Dr. Stowell's research involves studying the factors influencing air emissions from animal production and assessing the impacts of emitted aerial pollutants on rural communities. His teaching interests focus on environmental considerations of modern animal agriculture and ways for livestock producers and communities to effectively maintain air quality.

**Wayne E. Woldt** Associate Professor  
UNL - 1990  
Ph.D. University of Nebraska-Lincoln Civil Engineering 1990

Dr. Woldt's primary emphasis areas are environmental and water resources systems engineering. General areas of interest include watershed modeling with emphasis on innovative methods for consideration of complexities in the management of conjunctive surface/groundwater systems. Specific areas of research and teaching include: multi-scale modeling of porous media, consideration of imprecision in environmental/hydrologic systems and their management using soft computing techniques; adaptive infrastructure management at the community/water-cycle interface; methods to consider challenges of scale translation in watershed simulation modeling; modeling fate and transport of solutes in the environment; and development of systems analysis approaches for management of watershed systems.

**Ron Yoder** Professor and Head  
UNL - 1999  
Ph.D. Colorado State University Agricultural Engineering 1988

Dr. Yoder's primary research interests are in evapotranspiration, crop water use, soil water measurement, and transport of water and solutes in the vadose zone. His teaching interests include courses in irrigation design and measuring components of the hydrologic cycle.

**Tian C. Zhang** Associate 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. The minimum job experience or courses must also include computer programming and substantial engineering design. These courses are selected to enable the MSEE student to pass the Fundamentals of Engineering Examination (FE), a national exam necessary as a first step toward registration as a licensed professional engineer. 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 334 Introduction to Geotechnical Engineering *or*
- CIVE 352 Introduction to Water Resource Engineering *or*
- BSEN 350 Soil and Water Resources Engineering

*and one of the following:*

- CIVE 419 Flow System Design *or*
- CHME 453 Chemical Engineering Process Design *or*
- CIVE 425 Environmental Engineering Process Design *or*
- BSEN 480 Biological Systems Engineering Design.

In a worst case scenario, a student having none of the prerequisite courses or equivalencies would have to complete 54 credits hours to make up the deficiencies.

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. 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

### Check List for the Master of Science Degree

1. Meet with the Director (or his/her designee) of the MSEE Graduate Program and register for courses to be taken during the first semester. If you do not have an advisor, a temporary advisor in the student's area of interest will normally be assigned to assist in this process.
2. If an advisor has not already agreed to assist you, consult with potential advisors during the first 6 weeks of your graduate program. The Director of the MSEE Graduate Program must be notified of your decision on an advisor. The director will check with your advisor to see if the decision is mutual. If desired, a change can be made in the major advisor up to the time the Memorandum of Courses is filed.
3. Prepare a Tentative Program of Study in consultation with your advisor. Forms are available in each of the respective "home" departmental offices.
4. Students selecting Option I should select a supervisory committee prior to completion of one-half of the credit hours in your program. Notify the Director of the MSEE Graduate Program of the faculty members on the committee. A copy of a Guidebook for Preparing a Thesis or Dissertation is available from the home departments or the graduate studies office.
5. Prior to completion of one-half of the credit hours of your graduate program, file a completed Memorandum of Courses form with the Graduate Studies Office. The form may be obtained from the respective home department graduate coordinators.
6. Present at least one formally scheduled environmental engineering seminar and at least one departmental seminar during the graduate program.
7. File an Application for Advanced Degree form with the Records Office at the beginning of the semester or summer session in which graduation is planned, and pay the necessary fee. The application is valid only for the semester in which it is submitted. If requirements for graduation are not completed by the end of the semester, a new application will need to be filed and the fee will have to be paid again.
8. File a completed Final Examination Report for Masters Degree with the Office of Graduate Studies at least four weeks before the final examination is scheduled. Forms are available from the home department graduate coordinators.
9. Option I Students must present two copies of the thesis to the supervisory committee at least two weeks prior to the final oral examination. Upon successful completion of the examination and approval of the committee obtain the approval stamp from Graduate Studies and deposit two final copies of the thesis with the Dean of University Libraries. Deliver certificates of deposit signed by the examining committee and the Dean of University Libraries to the Office of Graduate Studies.

10. Option I students should check with the graduate student secretary in their home department to determine the departmental policy and tradition regarding copies of their thesis. Normally, the department will pay for its copy and perhaps for the advisor(s) copies. The departments typically have arrangements with companies that will do binding according to University specifications.
11. Option II and III students present a copy of your special problems report to the examining committee at an agreed upon time and place. Pass the final comprehensive examination. In some cases this may be done in conjunction with the oral report portion of the special problems requirement.
12. All students should clean out their office and their laboratory station before turning in their thesis. Their faculty advisor has the right to not approve their thesis until these areas are cleaned up to an accepted level.

## Appendix D

### 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 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 846 Unit Operations of Biological Processes

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

BSEN 935 Engineering Properties of Biological Materials

BSEN 841 Animal Waste Management

BSEN 941 Agricultural Waste Management

BSEN 998 Risk Assessment (cross-listed w/ CIVE)

#### 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 845 Advanced Chemical Engineering Kinetics

CHME 873 Biochemical Engineering

CHME 892 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 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 915 Water Resources Engineering  
CIVE 916 Engineering Economics and Legal Aspects of Water Resources Systems.  
CIVE 921 Hazardous Waste Site Remediation  
CIVE 926 Advanced Topics in Water Treatment  
CIVE 927 Advanced Topics in Wastewater Treatment  
CIVE 952 Water Resources Planning  
CIVE 954 Advanced Hydraulics  
CIVE 955 Solute Movement in Soils (cross-listed as AGEN 955 and AGRO 955)  
CIVE 958 Groundwater Mechanics  
CIVE 959 Groundwater Modeling

### **Offered in Other Departments**

AGRO 820 Herbicide Technology  
AGRO 855 Soil Chemistry and Mineralogy  
AGRO 860 Soil Microbiology  
AGRO 861 Soil Physics  
AGRO 875 Water Quality Strategies (cross listed as CIVE 875)  
AGRO 920 Pesticide Dissipation in Soils and Plants  
AGRO 955 Solute Movement in Soils (cross-listed as AGEN 955 and CIVE 955)  
AGRO 961 Advanced Soil Physics  
BIOM 801 Statistical Methods in Research  
BIOM 802 Experimental Design  
CHEM 821 Analytical Chemistry  
CRPL 870 Environmental Planning and Policy  
GEOL 888 Groundwater Geology  
GEOL 986 Contaminant Hydrogeology

## Appendix E

### Tentative Program of Study

Name: \_\_\_\_\_ SSN: \_\_\_\_\_

Admission Status: \_\_\_\_\_ Date: \_\_\_\_\_

Area of Study: \_\_\_\_\_

Option: \_\_\_\_\_

Thesis Research Area If Applicable: \_\_\_\_\_

Independent Study Area (Option II & III only): \_\_\_\_\_

### Tentative Plan of Courses:

Major  
(Environmental Engineering)

Minor (specify - if one is planned)

ENVE 990 (1 cr)

\_\_\_\_\_

CIVE 823 (3 cr)

\_\_\_\_\_

CIVE 828 (3 cr)

\_\_\_\_\_

CIVE 829 (3 cr)

\_\_\_\_\_

ENVE 899 (6 - 10 cr Option I only)

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\_\_\_\_\_

\_\_\_\_\_  
Student's Signature

\_\_\_\_\_  
Advisor's Signature

