CIVIL ENGINEERING

GRADUATE HANDBOOK

Refer to the most recent version of this handbook.
You can get the most recent handbook from the web.

Do not use former students' documents. Rules change!

Department of Civil Engineering

University of Nebraska-Lincoln

N104 SEC

Lincoln, NE 68588-6105

(402) 472-2371

engineering.unl.edu/civil

Last updated 23 January 2015

TABLE OF CONTENTS

Table of Contents i
Part I: Introduction 3
Program Overview 3
Program Mission and Goals 4
Graduate Studies and Research 4
Department of Civil Engineering Research Specialization Areas and Associated Faculty 4
Environmental Engineering 4
Geotechnical and Materials Engineering 5
Structural Engineering 5
Transportation Engineering 5
Water Resources Engineering 6
Department of Civil Engineering Support Staff 7
PART II: MASTERS OF SCIENCE PROGRAM IN CIVIL ENGINEERING 7
A Roadmap to your MS Degree in Civil Engineering 7
Provisional Admission and Deficiency Course Requirements 8
Advisor Assignment and Selection Process 8
MS Degree Requirements 9
Masters Degree – Option I 9
Masters Degree – Option II 10
Masters Degree – Option III 10
Roles and Responsibility of the Thesis Advisor 11
Roles and Responsibility of the Department 12
Formation of the Thesis Committee 12
Nature and Scope of Thesis 13
MS Examination Requirements and Format 13
Area-Specific MS Program Coursework Requirements 13
Specialization in Environmental Engineering: 13
Specialization in Geotechnical and Materials Engineering: 14
Specialization in Structural Engineering: 16
Specialization in Transportation Engineering: 17
Specialization in Water Resources Engineering: 18
PART III: PH.D. PROGRAM IN CIVIL ENGINEERING 20

A roadmap to your PhD degree 20
Summary of Coursework, Research and Examination Requirements 21
Supervising Professor/Academic Advisor 21
Supervisory Committee 21
PhD Curricula 22
Learning Outcomes of the PhD Program in Civil Engineering 22
Coursework and Research Requirements by Specialization 23
Program of Studies 23
Core Courses 23
Environmental Engineering 23
Geotechnical and Materials Engineering 24
Structural Engineering 24
Transportation Engineering 25
Water Resources Engineering 25
Examination Requirements 26
Qualifying Examination 26
Comprehensive Examination 27
Dissertation Requirements 28
Final Examination 28
PART IV: ASSISTANTSHIPS AND OTHER FINANCIAL SUPPORT 30
Graduate Research Assistantships 30
Graduate Teaching Assistantships 30
Other fellowship and scholarship opportunities 30
Graduate Student Evaluation 31
Appendix – Evaluation of Graduate Students 32

PART I: INTRODUCTION

Program Overview

The Department of Civil Engineering graduate program currently offers two degrees: the Master of Science (M.S.) and the Doctor of Philosophy (Ph.D.) in Civil Engineering. Each of these degrees requires the student to meet specific requirements of both the University of Nebraska-Lincoln Office of Graduate Studies and the Department of Civil Engineering. This handbook describes the departmental programs and requirements for each degree. This handbook is to be considered a supplement to the Graduate Studies Bulletin. Students are advised to consult the Graduate Studies Bulletin at bulletin.unl.edu for the Office of Graduate Studies degree requirements. Students should direct specific inquiries with respect to the Civil Engineering graduate programs to the following:

Graduate Chair

Dr. Shannon Bartelt-Hunt
Associate Professor
203B Peter Kiewit Institute
Omaha, NE 68182-0178

Phone: 402-554-3868
E-mail: sbartelt2@unl.edu

Graduate Secretary

Ms. Mellanie Gilroy
N104 SLNK
Lincoln NE 68588-6105

Phone: 402-472-2371
E-mail: mgilroy8@unl.edu

This handbook is divided into four parts. Part I discusses the Civil Engineering graduate program mission and goals, faculty and staff. Parts II and III describe the graduate degree requirements for the MS and PhD. Part IV covers assistantships and other financial support opportunities.

Program Mission and Goals
The mission of the Civil Engineering department is to provide a culturally diverse and intellectually stimulating environment for the discovery and application of knowledge in civil and environmental engineering; to educate our students to their fullest potential; and to serve the public through outreach and professional activities. In particular, the mission involves:

- Providing the nation with a new generation of engineers that can meet the challenges of the 21st century, particularly related to civil infrastructure
- Serving the state of Nebraska and the nation by providing state-of-the-art expertise in civil engineering
- Making important contributions in various areas of civil engineering by advancing existing knowledge and developing new technologies
- Facilitating the enrichment of the academic and professional experience of students, faculty and the engineering community
- Providing outreach to the public and private sectors

Graduate Studies and Research
The Civil Engineering department offers graduate degrees in Civil Engineering. The Master of Science (MS) degree requires completion of 30 to 36 credits of coursework depending on the option chosen. Option I is a thesis based option and is intended for students pursuing a research emphasis. Under this option a student must earn a minimum of 30 semester hours of credit, consisting of 20 to 24 semester hours of regular course work, and present a thesis equivalent to 6 to 10 semester hours. Options II and III are coursework based options. Under Option II a student must earn a minimum of 36 semester hours of credit in courses representing a major and either one or two minors. Option III also requires 36 semester hours of credit but does not require a minor. Doctoral study is intended for students seeking in-depth knowledge in an area of civil engineering beyond that resulting from an MS degree, and who wish to pursue faculty positions or other research positions in industry or governmental institutions. Applicants with a BS may apply directly to the PhD program. The minimum amount of graduate credit required for a PhD is 90 semester hours, including a dissertation. Some coursework done for a masters degree may be applied toward the required semester hours with approval of the student's supervisory committee and the Dean of Graduate Studies.

Department of Civil Engineering Research Specialization Areas and Associated Faculty
The Civil Engineering Department has 32 faculty members, 26 that are active, and 6 that are emeriti faculty (emeriti faculty cannot chair or co-chair graduate committees although they can serve on graduate committees). The Civil Engineering faculty are listed below by their area of specialization.

Environmental Engineering
The environmental engineering faculty offer graduate course in environmental engineering chemistry, physical chemical treatment processes, biologic treatment processes, design of water and wastewater treatment, environmental microbiology and solid and hazardous waste management. The faculty are engaged in research in

environmental microbiology, fate and transport of organic contaminants in soil and water, and design of drinking water and wastewater treatment technologies.

Faculty	Office	Email	Phone
Dr. Shannon Bartelt-Hunt	203B PKI, Omaha	sbartelt2@unl.edu	402-554-3868
Dr. Mohamed Dahab	N108 SEC, Lincoln	mdahab1@unl.edu	402-472-2371
Dr. Bruce Dvorak	N114 SEC, Lincoln	bdvorak1@unl.edu	402-472-3431
Dr. Xu Li	N117 SEC, Lincoln	xuli@unl.edu	402-472-6042
Dr. Tian Zhang	205D PKI, Omaha	tzhang1@unl.edu	402-554-3784

Geotechnical and Materials Engineering
The geotechnical and materials engineering faculty offer graduate courses in soil mechanics, foundation design including shallow and deep foundations, flexible and rigid pavement design, and infrastructure materials. The faculty are engaged in research focused on geomaterials, infrastructure materials and mechanics, safety and reliability of geotechnical structures supported on soils and foundations.

Faculty	Office	Email	Phone
Dr. Yong-Rak Kim	362N Whittier, Lincoln	ykim3@unl.edu	402-472-1727
Dr. John Rohde	204A PKI, Omaha	jrohde1@unl.edu	402-554-3049
Dr. Maria Szerszen	362Q Whittier, Lincoln	mszerszen2@unl.edu	402-472-8069

Structural Engineering
The structural engineering faculty offer graduate courses in advanced structural analysis, steel and concrete design, bridge engineering, and structural reliability. The faculty are engaged in research in structural dynamics, reliability, design of specialized concrete, highway design and protective design.

Faculty	Office	Email	Phone
Dr. Ron Faller	130R Whittier, Lincoln	rfaller1@unl.edu	402-472-6864
Dr. Gary Krause	204B PKI, Omaha	gkrause1@unl.edu	402-554-3212
Dr. Daniel Linzell	N115 SEC, Lincoln	dlinzell@unl.edu	402-472-8036
Dr. Joshua Steelman	362P Whittier, Lincoln	Joshua.steelman@unl.edu	402-472-1972
Dr. Christopher Tuan	203F PKI, Omaha	ctuan1@unl.edu	402-554-3867
Dr. Jinying Zhu	204C, PKI, Omaha	jyzhu@unl.edu	402-554-4459
Dr. Richard Wood	362K Whittier, Lincoln	rwood@unl.edu	402-472-1916

Transportation Engineering
The transportation engineering faculty offer graduate course in transportation planning, design, operations and safety with an emphasis on surface transportation. The faculty are engaged in research in transportation planning and safety, application of GIS to transportation problems, intelligent transportation systems, transportation systems analysis, traffic flow theory, traffic characteristics, traffic control systems, alternative

energy for transportation systems, operational effects of roadway geometrics, human factors, large scale modeling of transportation systems, transportation economics and airport planning and design.

Faculty	Office	Email	Phone
Dr. Elizabeth Jones	203E PKI, Omaha 330C Whittier, Lincoln	ejones1@unl.edu	402-554-3869
Dr. Aemal Khattak	330E Whittier, Lincoln	akhattak2@unl.edu	402-472-8126
Dr. Massoum Moussavi	203G PKI, Omaha	mmoussavi2@unl.edu	402-554-3414
Dr. Laurence Rilett	262D Whittier, Lincoln	lrilett2@unl.edu	402-472-1992

Water Resources Engineering

The water resources engineering faculty offer courses in surface water hydrology, groundwater engineering, hydraulic engineering, and water resources planning. The faculty are engaged in research in hydraulics, fluid mechanics, flow measurement and modeling, sediment transport, computational fluid dynamics (CFD), application of remote sensing and GIS in water resources, groundwater remediation, fate and transport of contaminants in groundwater, water resources management and risk analysis.

Faculty	Office	Email	Phone
Dr. David Admiraal	N113 SEC, Lincoln	dadmiraal2@unl.edu	402-472-8568
Dr. Junke Guo	204D PKI, Omaha	jguo2@unl.edu	402-554-3873
Dr. Ayse Kilic	311 Hardin, Lincoln	airmak2@unl.edu	402-472-8024
Dr. Yusong Li	362R Whittier, Lincoln	yli7@unl.edu	402-472-5972
Dr. Chittaranjan Ray	153C Hardin, Lincoln	cray3@unl.edu	402-472-8427
Dr. John Stansbury	205C PKI, Omaha	jstansbury2@unl.edu	402-554-3896

Department of Civil Engineering Support Staff
The Civil Engineering Department has six staff members who support the graduate program. Mellanie Gilroy, located on the Lincoln campus, is the Graduate Secretary. She is assisted by Arlys Blakey on the Omaha campus and Milunka Brajic on the Lincoln campus. Kelvin Lein manages the labs in Omaha and Peter Hilsabeck manages the labs in Lincoln. Andrew Loseke is the Administrative Technician in Lincoln.

Staff	Title	Office	Email	Phone
Arlys Blakey	Administrative Technician	200E PKI, Omaha	ablakey1@unl.edu	402-554-2462
Milunka Brajic	Administrative Coordinator	N104 SEC, Lincoln	mbrajic2@unl.edu	402-472-8088
Mellanie Gilroy	Graduate Secretary	N104 SEC, Lincoln	mgilroy8@unl.edu	402-472-2371
Peter Hilsabeck	Lab Technician	SEC 126C, Lincoln	philsabeck2@unl.edu	402-472-9336
Kelvin Lein	Lab Manager	126 PKI, Omaha	klein4@unl.edu	402-554-2041
Andrew Loseke	Administrative Technician	N104 SEC, Lincoln	aloseke2@unl.edu	402-472-2730

PART II: MASTERS OF SCIENCE PROGRAM IN CIVIL ENGINEERING

A Roadmap to your MS Degree in Civil Engineering
Students pursuing the M.S. Degree in Civil Engineering can follow a thesis option (Option I), or two coursework based options (options II and III). The typical path towards a M.S. Degree in Civil Engineering is as follows:

- Gain admission to the program.
- You will be assigned an advisor upon admission. Once you arrive you should meet with that academic advisor to plan your first semester schedule. If you find that you wish to change advisors, you are free to do so unless your advisor is providing you with a research assistantship on a specific project. If you are supported as a graduate research assistant (GRA), but there are extenuating situations that necessitate changing advisors, you should meet with your current advisor as soon as you decide this is necessary. As part of this meeting, you should plan to discuss how you will fulfill the obligations of your research assistantship. After meeting with your advisor, you should also meet with the graduate chair and your perspective advisor as soon as possible and complete the Change of Advisor form.
- Removal of admission deficiencies. If you have admission deficiencies, you will need to work with your advisor to develop a plan to remove them.
- The Memorandum of Courses must be filed before grades (letter grades, no reports or incompletes) have been received in more than one-half of the program

and on recommendation of the major and minor departments and approval of the Dean of Graduate Studies. The Memorandum of Courses is developed by the student and his or her advisor and serves as a roadmap of coursework needed to complete the MS. If needed, the Memorandum of Courses can be updated after it has been initially submitted. Updates to the Memorandum of Courses are done by submitting a new Memorandum of Courses.

- Complete the required coursework and your thesis (if you choose the Option I). Most master's degree students in our program finish within two years.
- Apply for advanced degree at the Graduation Services Office, 109 Canfield Administration Building, at the beginning of the semester or session in which graduation is planned.
- Pass the Written Comprehensive Examination. For Option I students, the thesis serves as the written comprehensive exam – an oral defense of the thesis is also required. Each area of Civil Engineering manages its own written comprehensive exam for Option II and Option III students.
- Submit the final thesis if Option I has been chosen.

Provisional Admission and Deficiency Course Requirements

The discipline diversity in the field of Civil Engineering leads to a student body with diverse backgrounds, and students are sometimes admitted under provisional status, and there may be collateral course requirements (courses that must be completed, but do not count toward the credit requirement). These decisions are made on the basis of submitted admission materials, and should be considered preliminary, based on our best estimate of your preparation for the M.S. program. Regardless of the type of admission, you will discuss your background and interests in your first meeting with your advisor, and he/she may suggest additional preparation as a part of your M.S. program.

International students who are admitted provisionally with a requirement for additional English language testing or coursework must address this before the start of their first semester. The English Language Center will administer the tests and provide requirements to your advisor for any language courses you will need as well as guidance on an appropriate first-semester academic load.

If you are admitted with other provisional requirements, you should make sure your advisor is aware of them and you should discuss how to address them early in your program. The provisional status will be changed to regular status when the conditions specified on the admission form have been met, as determined by the Associate Chair for Graduate Studies and approved by the Associate Dean for Graduate Studies.

Advisor Assignment and Selection Process

For students in the civil engineering master's graduate program, Option I, the faculty advisor is the student's academic advisor and thesis advisor. For Options II and III master's students, the faculty advisor is the academic advisor. Faculty advisors must be members of the civil engineering graduate faculty.

At the time of admission into the program, all students are assigned an advisor. Students who are admitted to the graduate program with a research assistantship that is provided by a particular faculty member will be assigned to that faculty member as their academic advisor and thesis/dissertation advisor. Other students may be admitted with a graduate assistantship or fellowship that is from general funds or third-party funds and not explicitly tied to a particular faculty member. In those cases, the selection of an advisor is based on mutual research interests, but the student is free to change advisors, if the student and advisor mutually agree that the change would be beneficial. A common reason to switch advisors is that the student is more interested in the research done by another faculty member than that of the advisor to which he/she was assigned.

The Department's policy is to establish that there is interest from at least one faculty member in advising the applicant prior to sending a letter of admission. When more than one faculty member has expressed interest in serving as academic advisor to a student who was admitted with an assistantship or fellowship from general funds or third parties, the student should select an advisor as soon as possible, typically within the first month and certainly by no later than the end of the first semester as a graduate student.

MS Degree Requirements

The Civil Engineering department offers graduate the Master of Science (MS) in Civil Engineering. The MS degree requires completion of 30 to 36 credits of coursework depending on the option chosen. Option I is a thesis based option and is intended for students pursuing a research emphasis. Under this option a student must earn a minimum of 30 semester hours of credit, consisting of 20 to 24 semester hours of regular course work, and present a thesis equivalent to 6 to 10 semester hours. Options II and III are coursework based options. Under Option II a student must earn a minimum of 36 semester hours of credit in courses representing a major and either one or two minors. Option III also requires 36 semester hours of credit but does not require a minor. More information about the MS degree options is available at
http://www.unl.edu/gradstudies/bulletin/masters-options

During the first semester of graduate study, the student is expected to work with the advisor to develop a draft Memorandum of Courses that meets the academic needs and interests of the student and complies with the M.S. civil engineering program requirements. The draft Memorandum of Courses specifies the courses and optional project or thesis that the student will complete. The initial consideration for most students is whether to satisfy the degree requirements through a coursework-only program (Option II or III), or by completing a coursework with thesis program (Option I).

Masters Degree – Option I

Under this option a student must earn a minimum of 30 semester hours of credit, consisting of 20 to 24 semester hours of regular course work, and present a thesis equivalent to 6 to 10 semester hours. At least one-half of the required work, including thesis, must be taken in Civil Engineering. The remaining work may be in supporting courses or in a minor consisting of at least 9 semester hours. Eight hours credit, in

addition to the thesis, must be earned in courses open exclusively to graduate students (900 level or 800 level without 400 or lower counterparts).

The subject of the thesis should be chosen from the candidate's field of major interest and must be approved by the student's major advisor. The thesis should reveal a capacity to carry on independent study or research and should demonstrate the student's ability to use the techniques employed in her/his field of investigation. The thesis must conform in style and form to the guidelines set forth in the Guidebook for the Preparation and Submission of an Electronic Thesis found on the UNL Graduate Studies website. An electronic copy of the thesis and abstract must be presented for preliminary review to the Masters Degree Specialist in the Office of Graduate Studies at least two weeks (one week in the summer sessions) before the date for the Candidate's oral examination. A Candidate is not eligible for the oral examination until the thesis is completed and approved by the major adviser. After the thesis has been successfully defended, it needs to be electronically submitted to the Masters Degree Specialist for a final review prior to being uploaded to digital commons.

Masters Degree – Option II
The masters degree under Option II is offered in the Department of Civil Engineering. This option encourages a wider range of courses than is permissible under Option I. Students who have taken the masters degree under Option II and later elect to continue in graduate work for the degree of doctor of philosophy must give evidence of ability to carry on independent research.

Under this option a student must earn a minimum of 36 semester hours of credit in courses representing a major and either one or two minors. A thesis is not required. A program consisting of a major and one minor must include not fewer than 18 hours in the major and 9 hours in the minor. If two minors are elected, the major must total at least 15 hours and the minors at least 9 hours each. Although most departments stipulate that all course work towards the minor must be taken within the department or interdepartmental area, at the discretion of the minor department up to one-third of the courses required for a minor may be transferred from other institutions. In either case, at least 12 of the 36 hours must be earned in courses open exclusively to graduate students (900 or 800 level without 400 or lower counterparts).

Masters Degree – Option III
The masters degree under Option III is designed especially for the student who plans to continue scholarly work in a civil engineering past the masters level. It permits the substitution of more intensive work in advanced courses for the thesis or minor. Under this option, 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 (900 or 800 level without 400 or lower counterparts). The program must include not fewer than 18 hours in civil engineering.

Minors Within the CIVE MS program
Under the MS Option I or Option II, a student may pursue up to two minors. At least 1 minor is required for the Option II MS. A minor typically consists of 9 (or more) credit hours in a specific area outside of the major department. The MS degree in Civil Engineering is designed for flexibility, with the required courses in each specialization counting for no more than 9-12 hours of the required 20-36 hours of coursework. A minor may be added to the Option I or II MS in Civil Engineering in a topic of interest to the student. In this past, common minors for CIVE MS students have included: statistics, business, engineering management, natural resources, and community and regional planning. The requirements for each minor vary, and students desiring a minor in a particular area should contact faculty in the department granting the minor to determine specific coursework requirements. Each minor may have requirements for the number of credit hours required as well as the specific courses which count toward the minor. Students are encouraged to identify a minor early in their academic program and work with their CIVE faculty advisor in conjunction with faculty in the department granting the minor to determine the specific coursework requirements.

Roles and Responsibility of the Thesis Advisor
The role of the advisor includes the following:

- Ensuring that graduate students receive information about requirements and policies of the graduate program.
- Advising graduate students on developing a program plan, including appropriate course work, research or creative activity, and on available resources.
- Advising graduate students on the selection of a thesis topic with realistic prospects for successful completion within an appropriate time frame and on the formation of a guidance committee.
- Providing training and oversight in creative activities, research rigor, theoretical and technical aspects of the thesis or project work, and in professional integrity.
- Encouraging graduate students to stay abreast of the literature and cutting-edge ideas in the field.
- Helping graduate students to develop professional skills in writing reports and papers, making professional presentations, establishing professional networks, interviewing, and evaluating manuscripts and papers.
- Providing regular feedback on the progress of graduate students toward degree completion, including feedback on research or creative activities, course work, and teaching, and constructive criticism if the progress does not meet expectations.
- Helping graduate students develop into successful professionals and colleagues, including encouraging students to participate and disseminate results of research or creative activities in the appropriate scholarly or public forums.
- Facilitating career development, including advising graduate students on appropriate job and career options, as well as on the preparation of application materials for appropriate fellowship, scholarship, and other relevant opportunities.
- Writing letters of reference for appropriate fellowship, scholarship, award, and job opportunities.

- Providing for supervision and advising of graduate students when the faculty advisor is on leave or extended absence.

Roles and Responsibility of the Department
Once a permanent thesis advisor is selected, it is unusual to change advisors. However, if a situation arises where a change seems imperative, the student should consult with the Department's graduate chair who will facilitate changes of faculty advisor.

Should the student's advisor leave UNL, it is the department chair's responsibility to facilitate arrangements that allow the student to successfully complete his/her degree program.

Formation of the Thesis Committee
Graduate students selecting the thesis option (Option I) have the responsibility to form a guidance committee with the approval and assistance of the student's advisor, and approval of the Graduate Chair. The guidance committee will consist of at least two members from the graduate faculty of the Department of Civil Engineering and one from the minor department (if applicable). If no minor is chosen, the committee should consist of at least three members from the graduate faculty of the Department of Civil Engineering. If a member of the committee other than the chair leaves the employ of the University, or retires, a replacement should be appointed. In certain circumstances where a special and needed continuing expertise is involved and the faculty member is willing to continue serving, the departing faculty member may continue as a member or co-chair of the committee, with approval of the department Graduate Committee and the UNL Dean of Graduate Studies. All professors on the committee must either be on the Graduate Faculty, or be non-Graduate Faculty approved to perform specified Graduate Faculty duties.

The responsibilities of the guidance committee include the following:

- Advising graduate students on course work, research, or creative activities.
- Providing, at least annually, feedback and guidance concerning progress toward the degree.
- Reviewing the thesis in a timely, constructive and critical manner.
- Committee chairpersons on leave shall provide for the necessary guidance of their advisees during their absence.

The responsibilities of the student include the following:

- Identifying, in consultation with the advisor, faculty members with the expertise and interest in supervising the proposed research, and meeting with them to discuss their willingness to serve in this capacity.
- Meeting with the guidance committee before the research plan is finalized to review the proposed work, and modify as appropriate.
- Keeping the committee informed on the progress of the research and soliciting their input to address unforeseen issues or to improve quality.
- Scheduling the final examination and providing the committee with a copy of the final written product at least two weeks before the examination.

Nature and Scope of Thesis
The final master's examination is the culmination of a student's graduate education and training and reflects not only the accomplishments of the graduate student but also on the quality of the graduate program. An approved thesis that is accepted by the graduate school becomes a single-author publication and contributes to the body of knowledge of the civil engineering discipline.

MS Examination Requirements and Format
For all specializations within Civil Engineering, the comprehensive examination for the MS Option I is met through the presentation of an oral thesis defense. For MS specializations in Geotechnical and Materials Engineering, Structural Engineering, Transportation Engineering and Water Resources Engineering, the comprehensive examination for MS Option II and III is met through a written examination. For the Environmental Engineering specialization, the comprehensive examination for Option II should consist of an oral defense of a report based on non-thesis research to be conducted by the student under guidance of their faculty advisor. For Option III students in all specializations in Civil Engineering, the comprehensive examination will consist of a written examination.

Area-Specific MS Program Coursework Requirements
Within the department of Civil Engineering, the following MS specializations are offered: Environmental Engineering, Geotechnical and Materials Engineering, Structural Engineering, Transportation Engineering, and Water Resources Engineering. Information regarding coursework and exam requirements for each specialization follows. Please note that a selection of a specialization with the MS Program in Civil Engineering is not required. The decision to pursue a specific specialization should be made with the input of your graduate advisor.

Specialization in Environmental Engineering:
<u>Required Core Courses (10 credit hours)</u>
CE 823 Physical/Chemical Treatment Processes, 3 cr
CE 828 (Environmental Engineering Chemistry, 3 cr
CE 829 (Biological Treatment Processes, 3 cr
ENVE 990 (Seminar in Environmental and Water Resources Engineering, 1 cr

<u>Elective Courses</u>
Each student must also choose electives that provide depth in his/her chosen area of focus within environmental engineering and/or appropriate breadth. These courses are to be selected in conjunction with and approved by the student's faculty advisor and supervisory committee. Relevant electives are listed below but not limited to the following:

Courses offered in the Department of Biological Systems Engineering
AGEN 853 Irrigation and Drainage Systems Engineering
AGEN 953 Advanced Irrigation and Drainage Systems Engineering

AGEN 954 Hydraulic Modeling of Small Watersheds
AGEN 955 Solute Movement in Soils (AGRO 955, CIVE 955)
BSEN 841 Animal Waste Management
BSEN 855 Nonpoint Source Pollution Control Engineering
BSEN 941 Agricultural Waste Management
BSEN 943 Bioenvironmental Engineering

Courses offered in the Department of Chemical Engineering
CHME 832 Transport Operations
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

Courses offered in the Department of Civil Engineering
CIVE 819 Flow Systems Design
CIVE 821 Hazardous Waste Management and Treatment
CIVE 822 Pollution Prevention: Principles and Practices
CIVE 824 Solid Waste Management Engineering
CIVE 826 Design of Water Treatment Facilities
CIVE 827 Design of Wastewater Treatment and Disposal Facilities
CIVE 830 Fundamentals of Water Quality Modeling
CIVE 831 Small Treatment Systems
CIVE 832 Bioremediation of Hazardous Wastes
CIVE 852 Water Resources Development
CIVE 854 Hydraulic Engineering
CIVE 856 Surface Water Hydrology
CIVE 858 Groundwater Engineering
CIVE 875 Water Quality Strategy (AGRO 875)
CIVE 898 Special Topics
CIVE 915 Water Resources Engineering
CIVE 916 Interdisciplinary Seminar in Engineering Economics and Legal Aspects of Water Resources Systems
CIVE 921 Advanced Topics in Hazardous Waste Treatment and Remediation
CIVE 926 Advanced Topics in Water Treatment
CIVE 927 Advanced Topics in Water Treatment
CIVE 952 Water Resources Planning
CIVE 954 Advanced Hydraulics
CIVE 955 Solute Movement in Soils (AGEN 955, AGRO 955)
CIVE 958 Groundwater Mechanics
CIVE 959 Groundwater Modeling

Specialization in Geotechnical and Materials Engineering:
Required core courses (12 credits)

Core courses (12 credits), listed below, provide exposure to the basic aspects of geotechnical-materials engineering. Students who have already taken such courses have an increased number of electives that they can take as part of their program.

CIVE 834 Soil Mechanics II (3 credits)
CIVE 836 Foundation Engineering (3 credits)
CIVE 872 Pavement Design and Evaluation (3 credits)
CIVE 851 Introduction to Finite Element Analysis (3 credits)

Students must either take the classes above or show that they have taken equivalent courses in their undergraduate program or in another graduate program.

Elective courses
Each student must also choose electives that provide depth in his/her chosen area of focus within geotechnical-materials engineering and/or appropriate breadth. These courses are to be selected in conjunction with and approved by the student's faculty advisor and supervisory committee. Relevant electives are listed below but not limited to this.

Civil Engineering Electives
CIVE 835 Experimental Soil Mechanics
CIVE 840 Reinforced Concrete Design
CIVE 842 Structural Dynamics
CIVE 844 Structural Design and Planning
CIVE 848 Nonlinear Structural Analysis
CIVE 857 Applied Structural Analysis
CIVE 861 Urban Transportation Planning
CIVE 862 Airport Planning and Design
CIVE 863 Highway Geometrics
CIVE 864 Transportation Characteristics
CIVE 866 Transportation Planning and Economics
CIVE 867 Transportation Safety Engineering
CIVE 868 Bituminous Materials and Mixtures
CIVE 898 Special Topics in Civil Engineering (by permission of advisor only)
CIVE 998 Special Topics in Civil Engineering (by permission of advisor only)

Construction Management Electives
CNST 885 Construction Project Scheduling and Control
CNST 886 Construction Management Systems

Mechanical and Materials Engineering Electives
MECH 847 Advanced Dynamics
MECH848 Advanced Mechanics of Materials
MECH 854 Introduction to Continuum Modeling
MECH 852 Experimental Stress Analysis I
MECH 880 Numerical Methods in Engineering
MECH 910 Continuum Mechanics

MECH 918 Fundamentals of Finite Elements
MECH 930 Mechanics of Composite Materials
MECH 933 Theory of Elasticity I
MECH 934 Theory of Elasticity II
MECH 939 Viscoelasticity
MECH 940 Fracture Mechanics
MECH 942 Theory of Plasticity

Statistics Electives
STAT 801 Statistical Methods in Research
STAT 802 Experimental Design
STAT 870 Multiple Regression Analysis

Mathematics Electives
MATH 814 Applied Linear Algebra
MATH 815 Modern Algebra with Applications
MATH 821 Differential Equations
MATH 822 Advanced Calculus
MATH 824 Introduction to Partial Differential Equations
MATH 827 Mathematical Methods in the Physical Sciences
MATH 830 Ordinary Differential Equations I
MATH 831 Ordinary Differential Equations II
MATH 840 Numerical Analysis I
MATH 842 Methods of Applied Mathematics I
MATH 843 Methods of Applied Mathematics II

Specialization in Structural Engineering:
Required basic core courses
Structural engineering graduate students are strongly encouraged to take all courses listed as core courses, below. However, students are *required* to take a minimum of 9 total credits of core courses. Selection of core courses shall consist of *at least* one Computational / Analysis course (3 credits) and *at least* one Advanced Design course (3 credits). Students who have already taken such courses have an increased number of electives that they can take as part of their programs.

Computational / Analysis core courses:
CIVE842 Structural Dynamics (3 credits)
CIVE851 Introduction to Finite Element Analysis (3 credits)

Advanced Design core courses:
CIVE846 Steel Design II (3 credits)
CIVE847 Reinforced Concrete Design II (3 credits)
CIVE850 Prestressed Concrete (3 credits)

Students must either take core classes from among those listed above to fulfill the core course requirements or show that they have taken equivalent courses in their undergraduate program or in another graduate program.

Elective courses

Each student must also choose electives that provide depth in his/her chosen area of specialization within structural engineering and/or appropriate breadth. These courses are to be selected in conjunction with and approved by the student's faculty advisor and supervisory committee. Relevant structures electives are listed below. Electives are not limited to this list, however.

CIVE845 Structural Analysis III (3 credits)
CIVE848 Nonlinear Structural Analysis (3 credits)
CIVE849 Reinforced Masonry Design (3 credits)
CIVE857 Applied Structural Analysis (3 credits)
CIVE940 Behavior of Steel Members (3 credits)
CIVE941 Behavior of Reinforced Concrete Members (3 credits)
CIVE942 Structural Systems in Steel (3 credits)
CIVE943 Structural Systems in Reinforced Concrete (3 credits)
CIVE944 Behavior of Miscellaneous Structural Materials (3 credits)
CIVE945 Structural Design for Dynamic Loads (3 credits)
CIVE946 Advanced Structural Engineering (3 credits)
CIVE947 Design of Thin Shell Structures (3 credits)
CIVE948 Blast-resistant Structural Design (3 credits)
CIVE949 Bridge Design (3 credits)

Specialization in Transportation Engineering:

Required basic core courses

Basic/core courses (9 credits), listed below, provide exposure to the various aspects of transportation and background in applied statistics (implicit in the 800-level transportation classes). Students who have already taken such courses have an increased number of electives that they can take as part of their program.
CIVE861 Urban Transportation Planning (3 credits)
CIVE862 Highway Design (3 credits)
CIVE863 Traffic Engineering (3 credits)

Students must either take the classes above or show that they have taken equivalent courses in their undergraduate program or in another graduate program.

Required core courses

In addition to the required courses above (traffic engineering, transportation planning, and highway design), PhD students are also required to take the three following courses for a total of nine (9) credits. These courses provide more depth in key areas.
CIVE864 Analysis & Estimation of Transportation Demand (3 credits)
CIVE865 Highway Geometrics (3 credits)
CIVE866 Transportation Characteristics (3 credits)

In addition to the three courses above, all PhD students are required to take the following:
STAT801 Statistical Methods in Research (4 credits)
CIVE989 Transportation Seminar (1 credit)

Students must either take the classes above or show that they have taken equivalent courses in another graduate program.

Elective courses
Each student must also choose electives that provide depth in his/her chosen area of specialization within transportation and/or appropriate breadth. These courses are to be selected in conjunction with and approved by the student's faculty advisor and supervisory committee. Relevant transportation electives are listed below. Electives are not limited to this list, however.
CIVE867 Transportation Safety Engineering (3 credits)
CIVE868 Airport Planning & Design (3 credits)
CIVE869 Computer-aided Interchange Design (3 credits)
CIVE961 Mass Transit Systems (3 credits)
CIVE962 GIS in Transportation (3 credits)
CIVE963 Highway Safety Data Analysis (3 credits)
CIVE964 Theory of Traffic Flow (3 credits)
CIVE965 Traffic Control Systems (3 credits)
CIVE966 Transportation Planning & Economics (3 credits)
CIVE967 Analysis & Design of Transportation Supply Systems (3 credits)

Specialization in Water Resources Engineering:
Required Core Courses
To obtain a specialization in water resources engineering, students must take the courses listed below or demonstrate to the satisfaction of the specialization advisory committee that they have taken sufficient course-work to cover the material in these courses:

CIVE 854 Hydraulic Engineering (3 credits)
CIVE 856 Surface Water Hydrology (3 credits)
CIVE 858 Groundwater Engineering (3 credits)
ENVE 990 Seminar in Environmental Engineering (1 credit)

Elective Courses
Students must choose electives that provide depth and breadth in water resources engineering. These courses are to be selected in conjunction with, and approved by the student's faculty advisor and supervisory committee.

A partial list of relevant water resources electives are listed below:
CIVE 819 Flow Systems Design (3 credits)
CIVE 830 Fundamentals of Water Quality Modeling
CIVE 852 Water Resources Development
CIVE 855 Nonpoint Source Pollution Control Engineering

CIVE 875 Water Quality Strategy
CIVE 898 Special Topics
CIVE 915 Water Resources Engineering
CIVE 916 Interdisciplinary Seminar in Engineering: Economic and Legal Aspects of Water Resources Systems
CIVE 952 Water Resources Planning
CIVE 954 Advanced Hydraulics
CIVE 958 Groundwater Mechanics
CIVE 959 Groundwater Modeling
AGEN 853 Irrigation and Drainage Systems Engineering
AGEN 953 Advanced Irrigation and Drainage Systems Engineering
AGEN 954 Hydraulic Modeling of Small Watersheds
AGEN 955 Solute Movement in Soils

PART III: PH.D. PROGRAM IN CIVIL ENGINEERING

A roadmap to your PhD degree

The typical path toward a doctoral degree in Civil Engineering at the University of Nebraska-Lincoln is as follows:

- Gain admission to the program. For most of our admitted Ph.D. students, financial aid is provided in the form of a graduate assistantship.
- You will be assigned an academic advisor based on your interests. If you receive a graduate research assistantship, then your academic advisor will be the faculty member providing your assistantship support. Your advisor will be a member of the department graduate faculty and will serve as the chairperson of your doctoral supervisory committee. If you find that you wish to change advisors, you are free to do so unless your advisor is providing you with a research assistantship on a specific project. If you are supported as a graduate research assistant, but there are extenuating situations that necessitate changing advisors, you should meet with your current advisor as soon as you decide that this is necessary. As part of this meeting, you should plan to discuss how you will fulfill the obligations of your research assistantship. You and your current advisor must put in a letter signed by both you and your current advisor that fully describes how you will fulfill the obligations of your research assistantship. After meeting with your current advisor, you should also meet with your current advisor and your perspective advisor as soon as possible. You must have a letter signed by you, your current advisor and your perspective advisor stating that all have agreed to this change of advisor.
- Pass the doctoral qualifying exam. The qualifying exam must generally be taken within the first 20 hours of graduate course work. Current master's students transferring to the Ph.D. should take the qualifying exam prior to starting the Ph.D. or during the first semester in the Ph.D. program. Students may only take the qualifying exam twice. If you do not pass the exam in either attempt, you will be removed from the graduate program. Details about the qualifying exam can be found in later in this handbook.
- After passing the qualifying exam, choose your Supervisory Committee and submit the Appointment of the Supervisory Committee form to Graduate Studies.
- Design a program of coursework with your Supervisory Committee. The Program of Studies for the Doctoral Degree should be submitted to Graduate Studies within the semester of the approval of your Supervisory Committee by Graduate Studies.
- Pass the comprehensive exam, including a successful presentation of your dissertation proposal. This is done when coursework has been substantially completed.

Complete your research, write your dissertation, and defend it in an oral examination. Most Ph.D. students in civil engineering at UNL should be able to finish their doctoral program in an average of approximately three to four years (beyond the M.S. degree).

Summary of Coursework, Research and Examination Requirements
The PhD degree in Civil Engineering should ordinarily take no more than five years to complete. While individual circumstances will vary, a typical timeline will be as follows:
Year 1 (0-21 credits): Coursework and qualifying examination
Year 2 (22-42 credits): Coursework, preliminary research, supervisory committee selection, submission of Program of Studies
Year 3 (43-63 credits): Coursework, preliminary research, comprehensive exam
Year 4 (64-84 credits): Research
Year 5 (85 or more credits): Research, completion of dissertation, final oral examination

Supervising Professor/Academic Advisor
The Civil Engineering Graduate Committee provides oversight of academic advising for current graduate students. All Civil Engineering graduate students must have a Civil Engineering graduate faculty member as their academic advisor, including those Civil Engineering students funded by faculty from another department. If a faculty member from another department is providing funding for a Civil Engineering graduate student, that faculty member may serve as a co-chair of the students committee. Upon admittance to the Civil Engineering department's graduate program each graduate student is assigned a personal academic advisor. The academic advisor is assigned based on the survey of Civil Engineering faculty regarding the admission of an applicant. If more than one faculty member has agreed to be the advisor for an applicant, the graduate student's initial temporary academic advisor will be the graduate committee member for the graduate student's discipline. The newly admitted graduate student will then visit with all faculty expressing interest in advising the student, and the student will select their advisor from the Civil Engineering faculty expressing interest in advising the student. All newly admitted graduate students with a choice of academic advisors must choose their academic advisor by no later than the end of the second week of the semester to which they are admitted.

Supervisory Committee
Each graduate student admitted to the doctoral program must form a supervisory committee in consultation with their supervising professor. The supervisory committee for any doctoral student should be formed prior to the completion of 36 hours of coursework and not later than the completion of 45 hours of coursework.

The committee will consist of at least four Graduate Faculty members. The majority of the committee members are expected to be Civil Engineering Graduate Faculty members. At least one Graduate Faculty member external to the academic department or area in which the doctorate is to be granted must be included on the committee responsible for supervising the student's doctoral program of studies. The representative of the minor department on the committee may serve as the outside representative. All faculty on the supervisory committee must either be on the Graduate Faculty, or be non-Graduate Faculty approved by the department Graduate Committee, the department Graduate Chair and the Dean of Graduate Studies to perform specified Graduate Faculty duties. Contact the department Graduate Chair for information on the process needed to have a non-Graduate Faculty member approved to serve on your committee.

PhD Curricula

The graduate curricula consist of three elements:

i. Learning outcomes
ii. Coursework requirements
iii. Examination requirements

Each element is covered below.

Learning Outcomes of the PhD Program in Civil Engineering

- *Fundamental Knowledge*: Graduates will command profound basic and applied knowledge in their specialty area within their specialization. This will be achieved through their coursework. Evaluation of this outcome will be through the qualifying exam.
- *Independent Abilities*: Graduates will have the ability to conduct a major independent and original research study that includes gathering of information, gaining an understanding of the process of academic or commercial exploitation of research results, demonstrating an understanding of contemporary research issues, effective project management, synthesis and evaluation, and appropriate dissemination of research findings. This outcome will be achieved through and evaluated using their dissertation research and publications resulting from the dissertation research.
- *Critical Thinking*: Graduates will have a profound ability to critique and synthesize literature, review results and to apply knowledge gained from literature to develop new ideas, to design and evaluate scientific investigations, and to assess, interpret and understand data related to their specialty area within their specialization. Evidence of this outcome is demonstrated in and evaluated using the comprehensive exam and the dissertation research.
- *Advanced Knowledge*: Graduates will demonstrate profound mastery of the subject matter at a deeper theoretical and applied level well beyond fundamental knowledge gained in the undergraduate course sequence and the higher-level knowledge gained in the master's level course sequence. Evidence of this will be demonstrated through the qualifying exam, the comprehensive exam and the final exam.
- *Effective Communication*: Graduates will have the ability to construct coherent arguments and articulate ideas clearly to an audience, through a variety of techniques, constructively defend research outcomes, justify their research to the profession and promote the public understanding of their research fields. This will be achieved through presentation and publication of the student's dissertation research.
- *Professional Development:* A student graduating with a doctoral degree in civil engineering is expected to demonstrate interest in pursuing life long learning by attaining professional licenses, and obtaining professional development hours by attendance at conferences, higher educational classes, short courses and seminars, conducting classes, and publishing. Periodic surveys of our graduates will be the method used to evaluate this outcome.

The Civil Engineering major has five specializations – environmental engineering, geotechnical and materials engineering, structural engineering, transportation engineering, and water resources engineering.

Coursework and Research Requirements by Specialization
The minimum amount of graduate credit is 90 semester hours, including a dissertation. Up to 30 credits from a master's degree may be counted towards the PhD in Civil Engineering. The PhD program in Civil Engineering will normally include a minimum of 12 hours and a maximum of 55 hours of dissertation research. There is no uniform language or research tool requirement for the PhD in Civil Engineering.

Program of Studies
It is important that the coursework clearly support and are related to the area of research that will form the basis for the dissertation. A mismatch between the coursework and the dissertation research may significantly lengthen the time to complete the PhD degree. It is important that each student work closely with his or her supervising professor and supervisory committee to develop a Program of Studies that not only fulfills the coursework requirements described below but also supports the student's intended research work. A Program of Studies should be completed, approved by the student's supervisory committee and submitted to the Office of Graduate Studies prior to the completion of 36 hours of coursework and not later than the completion of 45 hours of coursework. Completion of a Program of Studies later than this may cause the student to be required to take additional courses beyond the typical amount of coursework for a PhD student and significantly delay the completion of the PhD degree.

Core Courses
Each discipline has a set of required core courses that they expect all students graduating with a PhD to have successfully taken. The specific coursework requirements vary by specialization as described below.

Environmental Engineering
Preparatory/Required Undergraduate Courses
Although an undergraduate degree in Civil Engineering is not required as a prerequisite to the PhD program in environmental engineering, students who do not have a BS in civil engineering will normally be required to complete those undergraduate courses that provide appropriate background. Required undergraduate preparatory coursework will include mathematics through differential equations; a course in computer programming; 12 hours of chemistry, physics or geology courses, and 12 hours of engineering sciences courses including statics, fluid mechanics and 6 hours of coursework from the following courses (or their equivalent): ENGM 373 Engineering Dynamics, ENGM 325 Strength of Materials, CHME 332 Transport Operations I, PHYS 212, and ELEC 211

An introductory course in environmental engineering (CIVE 326 or equivalent), an introductory environmental engineering laboratory course (CIVE 327 or equivalent), and one additional 400-level environmental engineering course (such as CIVE 425 Environmental Engineering Process Design) will typically be required.

Required basic core courses, required core courses and elective courses
All environmental PhD students will be expected to complete similar coursework to what is listed under the MS program coursework requirements for the specialization in Environmental Engineering. Please refer to the course requirements for MS students in this document.

Geotechnical and Materials Engineering
Preparatory/Undergraduate core courses
Although an undergraduate degree in civil engineering is not required as a prerequisite to the PhD program in geotechnical-materials engineering, students who do not have a BS in civil engineering will normally be required to complete those undergraduate courses that provide appropriate background. Required undergraduate preparation would generally include mathematics (through calculus, geometry, and differential equations), an introductory course in statistics (e.g., STAT 380 at UNL) or an equivalent, and engineering mechanics (e.g., MECH 223 and 325 at UNL). General introductory courses in geotechnical-materials (e.g., CIVE 334 and 378 at UNL) are also necessary. While 300 (junior)-level courses cannot count toward the program requirements, a limited number of 400 (senior)-level classes with a corresponding 800-level component (15 credits) can be counted.

Required basic core courses, required core courses and elective courses
All geotechnical and materials PhD students will be expected to complete similar coursework to what is listed under the MS program coursework requirements for the specialization in Geotechnical and Materials Engineering. Please refer to the course requirements for MS students in this document.

Minor
All geotechnical-materials engineering PhD students are encouraged but not required to have a minor in a closely related discipline. Minors selected by previous students include Mechanical and Materials Engineering, Construction Management, Statistics and Mathematics.

Structural Engineering
Preparatory/Undergraduate core courses
Although an undergraduate degree in civil engineering is not required as a prerequisite to the PhD program in structural engineering, students who do not have a BS in civil engineering will normally be required to complete those undergraduate courses that provide appropriate background. Required undergraduate preparation would generally include mathematics through differential equations and an introductory course in statistics (e.g., STAT380 at UNL) or an equivalent. A general introductory course in structures (e.g., CIVE 341 at UNL) and one in a specific area (i.e., reinforced concrete design, steel design, and structural analysis) are also desirable. While 300 (junior)-level courses cannot count toward the program requirements, a limited number of 400 (senior)-level classes with a corresponding 800 -level component (15 credits) can.

Required basic core courses, required core courses and elective courses
All structural PhD students will be expected to complete similar coursework to what is listed under the MS program coursework requirements for the specialization in Structural Engineering. Please refer to the course requirements for MS students in this document.

Minor
All structural engineering PhD students are encouraged but not required to have a minor in a closely related discipline. Minors selected by previous students include Mathematics, Engineering Mechanics, and Construction Engineering/Management.

Transportation Engineering
Preparatory/Undergraduate core courses
Although an undergraduate degree in civil engineering is not required as a prerequisite to the PhD program in transportation engineering, students who do not have a BS in civil engineering will normally be required to complete those undergraduate courses that provide appropriate background. Required undergraduate preparation would generally include mathematics through differential equations and an introductory course in statistics (e.g., STAT380 at UNL) or an equivalent. A general introductory course in transportation (e.g., CIVE 361 at UNL) and one in a specific area (i.e., traffic engineering, highway design, and transportation planning) are also desirable. While 300 (junior)-level courses cannot count toward the program requirements, a limited number of 400 (senior)-level classes with a corresponding 800 -level component can (15 credits) can.

Required basic core courses, required core courses and elective courses
All transportation PhD students will be expected to complete similar coursework to what is listed under the MS program coursework requirements for the specialization in Transportation Engineering. Please refer to the course requirements for MS students in this document.

Minor
All transportation PhD students are encouraged but not required to have a minor in a closely related discipline. Minors selected by previous students include Statistics and Computer Science & Engineering.

Water Resources Engineering
Preparatory/Undergraduate Core Courses
Although an undergraduate degree in Civil Engineering is not required as a prerequisite to the PhD program in Civil Engineering with a specialization in Water Resources Engineering, students who do not have a BS in Civil Engineering will be required to complete those undergraduate courses that provide appropriate background for PhD study in Water Resources Engineering. Required undergraduate preparation would include:

- all of the mathematics required in the Civil Engineering undergraduate program (i.e., mathematics through differential equations),
- all physics required in the Civil Engineering undergraduate program
- engineering statics

- engineering dynamics
- an introductory course in statistics
- fluid mechanics
- an introductory course in water resources engineering

Required basic core courses, required core courses and elective courses
All water resources PhD students will be expected to complete similar coursework to what is listed under the MS program coursework requirements for the specialization in Water Resources Engineering. Please refer to the course requirements for MS students in this document.

Examination Requirements
All specializations have a qualifying exam requirement in addition to the comprehensive and final exam requirements. These exams are described below.

Qualifying Examination
The Department of Civil Engineering gives a Ph.D. qualifying exam to doctoral students with the dual purposes of: 1) identifying any admitted doctoral students who seem not to be qualified for doctoral studies in terms of either technical competence or aptitude for research, and 2) identifying weaknesses in student preparation that should be remedied by taking appropriate course work. It is understood that identification of an unqualified student should be rare, and that it may be considered to reflect a deficiency in the admissions process.

The qualifying exam must generally be taken within the first year of a student's PhD program (generally within the first 20 hours of graduate course work, not including transfer credits). Delays are approved only in unusual circumstances, such as a student who spends the first semester taking only or primarily undergraduate prerequisite courses or English language proficiency courses. Generally the exam is given two times per year. The graduate faculty of each specialty will announce to all students needing to take the qualifying exam the scheduled date of the qualifying exam at least four weeks in advance of the exam.

Each specialization gives a qualifying examination specific to students in that specialization. The format of all qualifying exams is the same. The student first sits for an eight-hour written exam that is followed approximately three weeks later by an oral exam. The oral exam is approximately two hours in length. It is expected that the qualifying exam for each specialty will be administered by the graduate faculty members in that specialization.

There are generally three possible outcomes for any given student who is taking the qualifying exam for the first time:

1) Unqualified pass,
2) Pass with the qualification that certain courses must be taken to remedy deficiencies in background preparation, and

3) Failure, with the option of retaking the exam one semester later, or at an alternate date mutually agreed upon by the student and the faculty. A failure on the second attempt is considered final and the student is removed from the graduate program.

A decision about the student's success or failure on the qualifying exam is made based on the student's performance on the written and oral exams.

It is the responsibility for the advising professor to report to the Graduate Chair the outcome of the qualifying exams. This should be done by email with a cc to the Graduate Secretary.

Comprehensive Examination
When a student has substantially completed studies in the doctoral program, he/she must pass a written and oral comprehensive examination, in major and minor or related fields. The written comprehensive examination is not a repetition of course examinations but is an investigation of the student's breadth of understanding of the field of knowledge of which his/her special subject is a part.

For all specializations in Civil Engineering, the comprehensive exam consists of a written portion and an oral portion. The written exam includes at a minimum a written dissertation proposal. The oral component may include the minor or related fields in addition to the major field of study.

The comprehensive exam is administered by the student's Supervisory Committee. The student will provide each member of their Supervisory Committee with a copy of the dissertation proposal at least two weeks before the exam date.

During the oral portion of the exam the student will provide a 20 minute presentation on their proposed topic. The presentation will be followed by questioning by the graduate committee. It is anticipated that the total time for the exam will be approximately 2 hours.

There are three possible outcomes for any given student who is taking the comprehensive exam for the first time:

1) Unqualified pass,
2) Pass with the qualification that the student work with their advisor to adjust the proposal, and
3) Failure, with the option of retaking the exam at an alternate date mutually agreed upon by the student and the faculty. Typically the maximum date will be six months from the date of the original exam. A failure on the second attempt is considered final. The student will either be asked to leave the graduate program or to find another dissertation topic.

A decision about the student's success or failure on the comprehensive exam is made based on the student's performance on the written and oral exams.

It is the responsibility for the advising professor to report to the Graduate Chair the outcome of the comprehensive exams. This should be done by email with a cc to the Graduate Secretary. This is in addition to the required reporting of the results to the Office of Graduate Studies.

When the student has passed the comprehensive examination and removed any provisional admission requirements, the student's supervisory committee will recommend to the Office of Graduate Studies the doctoral student's admission to Candidacy by filing the Application for Admission to Candidacy for the doctoral degree, noting the dates of completing the comprehensive examination.

Dissertation Requirements
The dissertation is of no fixed length. It should treat a subject from the Candidate's special field, approved by the supervisory committee. It should show the technical mastery of the field and advance or modify former knowledge, i.e., it should treat new material, or find new results, or draw new conclusions, or it should interpret old material in a new light. Each candidate for the degree shall submit with the dissertation an abstract of the same, not exceeding 350 words in length including the title. A guidebook for dissertation preparation is available on the Office of Graduate Studies Web site. For specific formatting guidelines, the Guidebook should be consulted.

Final Examination
The final examination for the doctoral degree is oral and open to members of both the University community and the public. During the dissertation presentation and general questioning all persons may be present. However, at the end of the public hearing there will be a closed questioning portion of the examination where all persons except the Candidate, doctoral supervisory committee, and invited faculty must be excused. It is given by the supervisory committee after the Candidate's studies have been completed and the dissertation accepted. The committee also determines its character and length. The examination may be devoted to the special field of the dissertation or to the Candidate's general knowledge, or it may be designed to test judgment and critical powers.

Two weeks prior to the date scheduled for the final exam, an announcement is prepared by the Candidate. This announcement should include: the dissertation title; the name of the Candidate and the Chair/Co-Chair of the Candidate's committee; a short (approximately 250 word) abstract; and the time, date and location of the oral examination. This announcement is sent to the Civil Engineering Graduate Chair and copied to the Graduate Secretary for dissemination to all CE faculty and students.

The final oral examination for the PhD will not be scheduled unless a majority of the supervisory committee, including the chair, are available for the examination. Exceptions may be made only by permission of the Dean of Graduate Studies. In any event, the supervisor of the dissertation must have seen and approved the completed dissertation before the examination will be scheduled.

The final oral examination over the dissertation may be waived only with the consent of the Graduate Dean. The committee reports the results of the final oral examination to the Office of Graduate Studies.

In the event that members of an oral examining committee are not unanimous regarding passing a Candidate, the student is to be approved for the degree if only one examiner dissents. However, in each case, the dissenting member of the committee will be expected to file a letter of explanation in the Office of Graduate Studies.

If a student fails to pass the final oral examination for an advanced degree, his/her committee must file a report on the failure in the Office of Graduate Studies and indicate what the student must do before taking another examination. Another examination may not be held during the same semester or the same summer session in which the student failed.

PART IV: ASSISTANTSHIPS AND OTHER FINANCIAL SUPPORT

At the University of Nebraska-Lincoln, Graduate Research Assistantships (GRAs) and Graduate Teaching Assistantships (GTAs) may be available to qualified students. Students funded with fellowships and as GRAs are typically Option I MS students or PhD students. Students may be funded as GTAs for a significant portion of their MS work or for a limited portion of their PhD work. A description of each type of assistantship and the criteria for selection are provided below.

Graduate Research Assistantships

Graduate research assistantships are available for graduate study in Civil Engineering. These assistantships are provided from an external grant or departmental or university funds to enable a student to work towards the advanced degree. Students receiving research assistantships may be expected to provide their academic adviser with a written report of their academic progress at the conclusion of the period for which the research assistantship is awarded. Work required by the graduate research assistantship that is not directly related to the student's own program shall not exceed 13-20 hours per week (.33 to .49 FTE). Decisions on graduate research assistantships are made on a case-by-case basis by individual faculty members.

Graduate Teaching Assistantships

A teaching assistantship provides a stipend to a student who is typically required to spend 13-20 hours per week (.33 to .49 FTE) during the academic year assisting in the teaching program of a department. The teaching assistant is expected to continue working towards the advanced degree while being a teaching assistant.

The Graduate Council recommends that graduate teaching assistants participate in workshops for teaching assistants. Graduate assistants may be expected to provide their academic adviser with a written report of their academic progress at the conclusion of the period for which the teaching assistantship is awarded.

Because of the potential for the exploitation of graduate students, any assignment of responsibilities, such as teaching a course, must be associated with a fair and reasonable compensation. This principle precludes a graduate student from “volunteering” for any significant service to the department without an appropriate stipend.

In the Department of Civil Engineering, selection of students to receive graduate teaching assistantships is made by the Department Chair in consultation with the department faculty. Selection of students to serve as graduate teaching assistants is typically made in the spring for the following academic year.

Other fellowship and scholarship opportunities

Other UNL or externally-funded scholarships or fellowships may be available to qualified students. Current information about UNL and externally-funded fellowships is available at: http://www.unl.edu/gradstudies

Graduate Student Evaluation
The Civil Engineering Graduate Faculty is committed to UNL's Guidelines for Good Practice in Graduate Education, available at: (http://www.unl.edu/gradstudies/current/downloads/goodpractice.pdf). This document states that "Graduate student progress toward educational goals at the University of Nebraska is directed and evaluated by an advisor, the relevant graduate committee, and the student's supervisory committee." It also states that faculty "Not impede a graduate student's progress and completion of his/her degree in order to benefit from the student's proficiency as a teaching or research assistant."

All GTAs will be evaluated annually according to CIVE guidelines to ensure they are making satisfactory progress towards their degree. A copy of the CIVE department's review forms for instructors and students is provided in an Appendix to this document.

In addition, all graduate students in the Department of Civil Engineering will undergo a yearly evaluation with their advisor, with the evaluation form to be filed with the Graduate Secretary. The annual review forms for MS and PhD students are provided in an Appendix.

Grading of Thesis and Dissertation Hours
Starting in 2015, thesis and dissertation hours will be graded on an XP/IP basis with an IP grade indicating that satisfactory progress was made during the semester, while an XP grade indicates that unsatisfactory progress was made during the semester. The decision regarding whether to assign a grade of XP or IP to a student registered for thesis or dissertation hours rests solely with the graduate faculty advisor and is based on research expectations discussed with the student. It is the responsibility of the CIVE graduate faculty advisor to ensure that XP/IP grades for thesis/dissertation hours and the student's annual evaluation are consistent. If 2 consecutive XP grades are given to a Civil Engineering graduate student, the Graduate Chair will contact the graduate student, faculty advisor, and Department Chair, requesting a meeting to discuss the student's performance.

APPENDIX – EVALUATION OF GRADUATE STUDENTS

Civil Engineering
University of Nebraska-Lincoln
Annual Progress Report for Master's Students – Due May 15

Student's Name _____ Academic Advisor _____

Portion Completed by the Student

Academic Progress
A copy of your unofficial transcript and your memorandum of courses should be attached to this report.

Date of entrance into program* _____ Expected completion date _____

*If admitted under provisional status, date provisional status removed _____

Date of most recent contact with your academic advisor _____

Type of degree sought
- ☐ Option I (thesis, optional minor option)
- ☐ Option II (non-thesis, required minor option)
- ☐ Option III (non-thesis, no minor option)

For Option I students:
Month & year or expected month & year of thesis proposal approval, if applicable _____
Month & year or expected month & year of thesis defense _____

For Option II and III students:
Month & year or expected month & year of comprehensive exam _____

Current GPA _____ Number of credits with a grade of B- or lower _____

Professional Performance and Potential

The student should prepare and attach the following information:
1. Current year's professional goal statement noting both academic and career goals
2. Next year's professional goal statement noting both academic and career goals
3. Resume/Vitae which may include the following
   a. Education background
   b. Employment background
   c. Papers published or submitted
   d. Presentations at professional conferences
   e. Other relevant information

Comment briefly on your progress in achieving your academic goals during the past year. Note areas in which you are experiencing any difficulty.

Comment briefly on your progress toward achieving your career goals during the past year. If you feel you are not making progress, explain why.

Civil Engineering
University of Nebraska-Lincoln
Annual Progress Report for Master's Students – Due May 15

Student's Name _____ Academic Advisor _____

Portion Completed by the Academic Advisor
Academic Progress

1. Has the student made acceptable progress during the evaluation period? Please comment below.

2. Please comment on the overall academic performance of the student, including teaching assistant experiences, if applicable (if the student served as a GTA for another faculty member, that faculty member's input on GTA performance should be included. Attach this year's departmental GTA review forms.)

Student Your signature below indicates that you have discussed the contents of this progress report with your academic advisor.

Student _____ Date _____

Academic Advisor Your signature below indicates that you have discussed the contents of this progress report with the student.

Academic Advisor _____ Date _____

Graduate Chair Your signature below indicates that you have received this progress report and have asked for it to be filed in the student's file.

Graduate Chair _____ Date _____

When the academic advisor and student have reviewed and signed this progress report and submitted it to the Graduate Chair, copies of the report must be given to the student and academic advisor. The original progress report must be placed in the student's file in the departmental office. Students have the option to discuss any part of the academic advisor's evaluation with the department graduate committee.

Civil Engineering
University of Nebraska-Lincoln
Annual Progress Report for PhD Students – Due May 15

Student's Name _____ Academic Advisor _____

Portion Completed by the Student

Academic Progress
A copy of your unofficial transcript and your program of courses should be attached to this report.

Date of entrance into program* _____ Expected completion date _____

*If admitted under provisional status, date provisional status removed _____

Date of most recent contact with your academic advisor _____

Month & year or expected month & year of qualifying exam _____ Passed? _____
Month & year or expected month & year of comprehensive exam_____ Passed? _____
Month & year or expected month & year of final oral exam _____

Current GPA _____ Number of credits with a grade of B- or lower _____

Professional Performance and Potential
The student should prepare and attach the following information:

1. Current year's professional goal statement noting both academic and career goals
2. Next year's professional goal statement noting both academic and career goals
3. Resume/Vitae which may include the following
   a. Education background
   b. Employment background
   c. Papers published or submitted
   d. Presentations at professional conferences
   e. Research participation
   f. Service participation
   g. Education participation (e.g., courses taught, grading, mentoring)
   h. Other

Comment briefly on your progress in achieving your academic goals during the past year. Note areas in which you are experiencing any difficulty.

Comment briefly on your progress toward achieving your career goals during the past year. If you feel you are not making progress, explain why.

Civil Engineering
University of Nebraska-Lincoln
Annual Progress Report for PhD Students – Due May 15

Student's Name _____ Academic Advisor _____

Portion Completed by the Academic Advisor

Academic Progress

1. Has the student made acceptable progress during the evaluation period? Please comment below.

2. Please comment on the overall academic performance of the student, including teaching assistant experiences, if applicable (if the student served as a GTA for another faculty member, that faculty member's input on GTA performance should be included. Attach this year's departmental GTA review forms.)

Student Your signature below indicates that you have discussed the contents of this progress report with your academic advisor.

Student _____ Date _____

Academic Advisor Your signature below indicates that you have discussed the contents of this progress report with the student.

Academic Advisor _____ Date _____

Graduate Chair Your signature below indicates that you have received this progress report and have asked for it to be filed in the student's file.

Graduate Chair _____ Date _____

When the academic advisor and student have reviewed and signed this progress report and submitted it to the Graduate Chair, copies of the report must be given to the student and academic advisor. The original progress report must be placed in the student's file in the departmental office. Students have the option to discuss any part of the academic advisor's evaluation with the department graduate committee.