CEE Graduate Student Guidelines Specific to the Environmental Engineering Area

Note: The guidance in this document applies to students entering in Fall 2012 and after. Students who entered the program prior to Fall 2012 should speak with their academic advisor for additional guidance.

Overview
The Civil and Environmental Engineering Department offers graduate programs leading to the Master of Science (MS) and Doctor of Philosophy (PhD) degrees in Civil and Environmental Engineering. The MS program emphasizes the enhancement of professional knowledge and skills, including research techniques. The PhD is a research degree emphasizing more extensive and original approaches to problem solving. Students typically earn an MS first, but may work directly toward the PhD if admitted directly to the PhD program. Incoming CEE graduate students are assigned a temporary academic advisor to help plan their programs until their major professor is determined. Major professors are assigned based on faculty and student interests, funding, and other commitments. Students are strongly encouraged to consult the current CEE Graduate Student Handbook (available online) for additional guidance on program requirements: http://www.engr.wisc.edu/cmsdocuments/cee-graduate-student-handbook_(1).pdf

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MASTER OF SCIENCE IN CIVIL AND ENVIRONMENTAL ENGINEERING
MS degree candidates choose from two options for their program of study: the thesis option (Option A), or the advanced independent study option (Option B). Students without a bachelor’s degree from an ABET-accredited engineering program, or from a recognized international institution, may pursue a third master's degree option (Option C). Selection of an option and course plan is dependent upon the educational objectives of the candidate.

Option A - Thesis Option: Option A requires a minimum of 30 credits of graduate work, including at least 18 credits of graduate-level coursework, and at least 6 credits of thesis work (CEE 790 - Master's Research or Thesis). At least 9 credits of the graduate-level coursework must be CEE courses¹. A faculty committee will conduct a final examination on the thesis research. Students who wish to do advanced work and research in a well-defined area of specialization are encouraged to pursue this program.

Option B - Advanced Independent Study Option: Option B requires a minimum of 30 credits of graduate work, including at least 21 credits of graduate-level coursework, and at least 3 credits of advanced independent study (CEE 790 - Master’s Research or Thesis or CEE 999 - Advanced Independent Study). At least 9 credits of the graduate-level coursework must be CEE courses¹. A required written report based on the student’s advanced independent study project does not have to meet UW-Madison Graduate School requirements for a thesis, but has to show independent thinking by the student. A faculty committee will review and approve the course work and final report. A final examination is not required but may be requested by the faculty committee.

¹ If a student has completed required graduate-level CEE courses as part of their undergraduate curriculum, or if less than 9 credits of graduate-level CEE courses are available to the student as part of their degree program, this requirement can be reduced or waived with the approval of the student’s faculty advisor and the Associate Chair for Graduate Programs.

Option C – Master’s Option for Students without Engineering Bachelor’s Degrees: This program is designed for students without engineering bachelor’s degrees. To initially become eligible for this program, applicants must meet these requirements found here:

http://www.engr.wisc.edu/cmsdocuments/cee-deficiency-requirements-document.pdf

Students will meet with the Student Services Office and their faculty advisor to determine the courses and total credits required to fulfill the deficiency requirements. As a general rule, students with more than 12 credits in deficiencies are not admitted to the program. Rather, they are encouraged to enroll as special students until more of their deficiencies are satisfied. Some of the deficiency course requirements may be completed after admission. The exact number of deficiency courses and credits completed before and after admission will be
determined by the faculty advisor. All pre-requisite courses must be taken for a letter grade.

In addition to the total deficiency credit requirement, Option C requires a **minimum of 30 credits** of graduate work. Students can select either a Thesis Option or Advanced Independent Study Option, consistent with the requirements of Option A or Option B described above, to complete the non-deficiency requirements of Option C. For example, a student with 10 credits of deficiency requirements will require a total of 40 credits to complete their degree, 10 deficiency credits and 30 graduate credits. Students should meet with their faculty advisor to determine which option is most appropriate for their degree plan. Deficiency credits cannot be applied to fulfill the 30 credit degree requirement.

It is important to note that some undergraduate degrees may require additional engineering courses to be completed, beyond those required to complete the degree requirements, if a student wishes to become eligible for professional engineering licensing. Students in Option C should discuss their individual case with the Student Services Office and their faculty advisor.

**Recommended Course Plans for the CEE MS Degree**

All MS students should create a course plan during their first semester on campus, preferably during the first month. This course plan must be approved by the student’s academic advisor during the student’s first semester in the program.

All degree plans in Option C shall be approved by the student’s faculty advisor and the Associate Chair of Graduate Program, using the form provided by the Student Services office:

http://www.engr.wisc.edu/cmsdocuments/cee-40-CreditMSfornon-EngrDegree.pdf

Completed forms shall be returned to the Student Services Office with a copy given to their faculty advisor.

The following **guidelines** are meant to assist MS students in creating their course plans. Students following these guidelines are much more likely to have their course plans approved easily.
Core Courses

- **CEE 929** – Environmental Engineering Seminar – 1 credit
  All students should enroll in seminar every semester

At least two courses from:

- **CEE 821** – Environmental Engineering: Biological Treatment Processes – 4 credits
- **CEE 822** – Environmental Engineering: Physical/Chemical Treatment Processes – 4 credits
- **CEE 500** – Water Chemistry – 3 credits

At least one course from:

- **CEE 502** – Environmental Organic Chemistry – 3 credits
- **CEE 423** – Air Pollution – Effects, Measurements, and Control – 3 credits
- **CEE 631** – Toxics in the Environment: Sources, Distribution, Fate, and Effects – 3 credits
- **CEE 700** – Chemistry of Natural Waters, 3 credits
- **CEE 609 or CEE 629** – Special Topics – variable number of credits – please check with your academic advisor before enrolling to determine if topic is suitable for meeting this category of recommended courses

Electives*

- **CEE 422** – Elements of Public Health Engineering, 3 credits
- **CEE 423** – Air Pollution – Effects, Measurements, and Control – 3 credits
- **CEE 426** – Design of Wastewater Treatment Plants, 3 credits
- **CEE 428** – Water Treatment Plant Design, 3 credits
- **CEE 500** – Water Chemistry – 3 credits
- **CEE 501** – Water Analysis Intermediate, 2 credits
- **CEE 502** – Environmental Organic Chemistry, 3 credits
- **CEE 619** – Special Topics in Water Resources Engineering, variable credits
- **CEE 623** – Microbiology of Waterborne Pathogens and Indicator Organisms, 3 credits
- **CEE 631** – Toxics in the Environment: Sources, Distribution, Fate, and Effects, 3 credits
- **CEE 633** – Waste Geotechnics, 3 credits
- **CEE 635** – Remediation Geotechnics, 3 credits
- **CBE 320** – Introductory Transport Phenomena, 4 credits
- **GEOL 627** – Hydrogeology, 3 credits
- **GEOL 629** – Contaminant Hydrogeology, 3 credits
- **STAT 424** – Statistical Experimental Design for Engineers, 3 credits
- **ZOOL 315** – Limnology-Conservation of Aquatic Resources, 2 credits
• **ZOOL 316** – Laboratory for Limnology-Conservation of Aquatic Resources, 2-3 credits
• **ZOOL 750** – Problems in Oceanography, 3 credits
• **BIOCHEM 501** – Introduction to Biochemistry, 3 credits
• **MICRO 303** – Biology of Microorganisms, 3 credits
• **MICRO 425** – Environmental Microbiology, 3 credits
• **MICRO 450** – Diversity, Ecology, and Evolution of Microorganisms, 2 credits
• **MICRO 523** – Soil Microbiology and Biochemistry, 3 credits
• **MICRO 526** – Physiology of Microorganisms, 3 credits

*Please note this is not a comprehensive list - see the UW Course Guide for additional possibilities. Suitable courses are generally 400-level and above within CEE, or 300-level and above outside of CEE.*
DOCTOR OF PHILOSOPHY IN CIVIL AND ENVIRONMENTAL ENGINEERING

The Doctor of Philosophy (Ph.D.) degree is the highest degree conferred by the University. It is a research degree and is never conferred solely as a result of any prescribed period of study, no matter how faithful. The degree is only granted on evidence of general proficiency, distinctive attainment in a special field, and, particularly, the ability for independent investigation as demonstrated in a dissertation presenting original research or creative scholarship with a high degree of literary skill. Students should consult their faculty advisors and the members of their committees about improving technical writing and presentation abilities through formal courses or other methods.

Basic requirements for a Ph.D. degree in civil and environmental engineering include: (1) Ph.D. Major Coursework; (2) Qualifying Examination; (3) Ph.D. Minor Coursework; (4) Preliminary Examination; (5) Dissertation Research; and (6) Final Oral Examination.

Major Coursework: The academic program for each doctoral student is planned on an individual basis, in consultation with the student’s primary research advisor and members of the thesis committee. In-depth, advanced coursework in a major departmental area is required. The Graduate School minimum PhD credit requirement is 32 credits, maintaining a cumulative GPA of 3.00.

Minor Coursework: The purpose of the minor is to add breadth to a Ph.D. major. Students are responsible for indicating the expected minor (either Option A or B, see below) at the time of the preliminary warrant request. A Ph.D. minor proposal form (http://www.engr.wisc.edu/cmsdocuments/cee-phd-minor-agreement-form.pdf), must be approved before, or by the time, the student has completed 6 of the total credits for the minor. Approval is usually sought at the qualifying exam.

Option A (External): Requires a minimum of 9 credits in a single department/program. Selection of this option requires the approval of the minor department/program.

Option B (Distributed): Requires a minimum of 9 credits in one or more departments/programs and can include course work in the major department/program. Selection of this option requires the approval of the major department/program (i.e. CEE). The CEE Graduate Associate Chair and the student’s academic advisor (or major professor) must review and approve the coursework plan.

The Graduate School’s minimum course requirements can be found on the web at http://grad.wisc.edu/acadpolicy/#126 and include:
• An average GPA of 3.00 on all minor course work.
• Course work must be graduate level (the equivalent of UW-Madison courses 300-level or above; no audits or pass/fail)
• Maximum 3 credits of independent study (e.g. 699, 799, 899, 999)
• Research and thesis credits cannot be used to satisfy the minor (e.g. 790, 890, 990)
• No more than 5 credits of course work completed more than five years prior to admission to the PhD; coursework taken ten years ago or more may not be used

Qualifying Examination: The qualifying exam is usually given after one year of graduate study beyond the M. S. degree. The exam is scheduled and coordinated by one of the core Environmental Engineering faculty members, usually in the spring semester. The exam is based on both a written and an oral component. Students should consult with their primary research advisor while planning to take their qualifying exam.

The coordinating faculty member selects the format for the exam, which is usually based on writing a research proposal. S/he selects or creates a “request for proposals” (RFP) with relevance to Environmental Engineering (e.g. from the Water Environment Research Foundation, Department of Energy, American Water Works Association). The proposal topic is usually related to the student’s research area but can draw upon any elements of Environmental Engineering, as is suitable for evaluating the student’s mastery of core concepts in the field. The faculty member distributes instructions for the exam to all students taking the exam and students have one week to prepare a written proposal in response to the RFP. The faculty member will then schedule an oral exam during which time the student will present and defend his/her proposal to a committee of three faculty in Environmental Engineering. The coordinating faculty member is responsible for assembling the committee (not the student).

A signature form (http://www engr.wisc.edu/cmsdocuments/cee-phd-qualifying-exam.pdf), verifying that a student has passed the qualifying exam, must be signed by the student’s advisor and returned to the staff in the South Student Services center (2258 Engineering Hall).

Preliminary Examination: The preliminary examination may be taken only after approval of the minor coursework plan (see above) and is generally taken one year after the qualifying exam. Students must take their preliminary exam at least two semesters before their final defense. This oral examination is based upon a written proposal and a detailed plan to carry out the Ph.D. dissertation. Students must consult with their advisor for specific details of the requirements for the preliminary
examination, and must also consult the current CEE Graduate Student Handbook for additional requirements and guidelines for committee composition.

Students must consult with their primary research advisor while selecting members of the preliminary exam committee. However, it is the students’ responsibility to contact potential committee members and to schedule the exam, after approval from the primary research advisor. The committee must have five members, four of whom must be tenured or tenure-track faculty members (Graduate Faculty). The fifth member may be from any of the following categories: Graduate Faculty, Academic Staff (including emeritus faculty), faculty from a department without a graduate program, visiting faculty, faculty from other institutions, Scientists, Research Associates (e.g. postdocs), and other individuals deemed appropriate by the rest of the committee. Generally, the primary research advisor is chair of the committee. The preliminary exam committee typically becomes the student’s final oral examination committee.

The preliminary exam warrant must be requested at least three weeks before the proposed exam date. Exam warrants can be obtained and should be turned into the staff in the CEE/ECE/GLE Student Services Office (2304a Engineering Hall). An approval form is available online (http://www.engr.wisc.edu/cmsdocuments/cee-phd-prelim-exam-checklist.pdf) where the student may check off the completion of the above requirements. The student must attach a current transcript (an unofficial transcript is acceptable) along with this approval form. Upon completing 32 weeks of residence (equivalent to four semesters with a minimum of eight credits taken in each semester), the preliminary examination, and the minor, a student is eligible to become a dissertator.

**Dissertation Research**: Attainment of a Ph.D. degree requires the preparation of a dissertation on a research topic selected by common agreement between the student and the advisor. Once a research project is selected, the student must choose their final oral exam committee (typically their preliminary examination committee). The final oral exam committee consists of four faculty members (besides the student’s advisor) in the area of specialization of the student. At least one, but no more than two members of the committee shall be from outside the Department of Civil and Environmental Engineering. Students must consult the current CEE Graduate Student Handbook for additional requirements and guidelines for committee composition.

**Dissertation Defense**: The student must schedule the date and time of his/her defense. Generally the student must submit a copy of his/her report or thesis at least seven days in advance of the oral exam to each committee member. If a shorter time is needed, the student must obtain permission from each member of the committee. The student is expected to prepare a 20-30 minute formal
presentation of his/her work. The student will then be expected to defend the results of his/her work. A typical oral exam for a PhD candidate will not last more than three hours.
Environmental Engineering Area within CEE  
(recommended courses)  
Graduate Coursework Planning Worksheet – MS Option A (Thesis)  

Total Credits Required: 30 with at least 18 credits of graduate coursework

<table>
<thead>
<tr>
<th>Course</th>
<th>Semester to take</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core Courses</td>
<td></td>
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</tr>
<tr>
<td>Seminar (CEE 929)</td>
<td>each</td>
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</tr>
<tr>
<td>At least two courses from:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biological Treatment Processes (CEE 821)</td>
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<td>4 cr</td>
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<tr>
<td>Physical/Chemical Treatment Processes (CEE 822)</td>
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<td>4 cr</td>
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<tr>
<td>Water Chemistry (CEE 500)</td>
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<td>3 cr</td>
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<tr>
<td>At least one course from:</td>
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<td></td>
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<tr>
<td>Env Organic Chemistry (CEE 502)</td>
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<tr>
<td>Air Pollution (CEE 423)</td>
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<td>3 cr</td>
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<tr>
<td>Chemistry of Natural Waters (CEE 700)</td>
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<td>3 cr</td>
</tr>
<tr>
<td>Special Topics (CEE 629)</td>
<td></td>
<td>variable credits</td>
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<tr>
<td>Special Topics (CEE 609)</td>
<td></td>
<td>variable credits</td>
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<tr>
<td>Electives</td>
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</tbody>
</table>

Research Credits – at least 6 credits

| Thesis Research (CEE 790) | most |

Total Credits: 30
Environmental Engineering Area within CEE

Graduate Coursework Planning Worksheet – MS Option A (Thesis)

Total Credits Required: 30 with at least 18 credits of graduate coursework

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>Core Courses</td>
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</tr>
<tr>
<td>Seminar (CEE 929) – 1 cr</td>
<td>each</td>
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</table>

Select at least 9 credits of CEE graduate coursework

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<tr>
<th>Course</th>
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<tbody>
<tr>
<td>Electives</td>
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</table>

Select enough electives to achieve 18 credits total of graduate coursework

<table>
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<tr>
<th>Course</th>
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</thead>
<tbody>
<tr>
<td>Research Credits – at least 6 credits</td>
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<td></td>
</tr>
<tr>
<td>Thesis Research (CEE 790)</td>
<td>most</td>
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</tbody>
</table>

Total Credits:
Environmental Engineering Area within CEE

Graduate Coursework Planning Worksheet – MS Option B (Indep Study)

Total Credits Required: 30 with at least 21 credits of graduate coursework

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<thead>
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<td>Core Courses</td>
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<td></td>
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<tr>
<td>Seminar (CEE 929) – 1 cr</td>
<td>each</td>
<td>1</td>
</tr>
</tbody>
</table>

*Select at least 9 credits of CEE graduate coursework*

| Electives                   |                  |         |

*Select enough electives to achieve 21 credits total of graduate coursework*

| Independent Study Credits – at least 3 credits |                  |
| Independent Study (CEE 999)                  | most             |

Total Credits:
Environmental Engineering Area within CEE
(recommended courses)
Graduate Coursework Planning Worksheet – MS Option B (Indep Study)

Total Credits Required: 30 with at least 21 credits of graduate coursework

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<tr>
<td>Special Topics (CEE 629) – variable credits</td>
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<tr>
<td>Special Topics (CEE 609) – variable credits</td>
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<tr>
<td>Electives</td>
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</tbody>
</table>

| Independent Study Credits – at least 3 credits |                  |         |
| Independent Study (CEE 999)                  | most             |         |
|                                              | Total Credits:   |         |