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CIVIL AND ENVIRONMENTAL ENGINEERING AT THE UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

The University of Illinois at Urbana-Champaign was founded March 2, 1868, under the Land Grant College Act signed by Abraham Lincoln. In 1870, the College of Engineering was established. In 1871, the Department of Civil Engineering was organized; and in 1872, four civil engineers were graduated. Now, more than 130 years since our organization, the Department of Civil and Environmental Engineering at the University of Illinois at Urbana-Champaign is one of the largest, most comprehensive, and highly ranked departments of Civil and Environmental Engineering in the country with approximately 800 undergraduates, 450 graduate students and a faculty of 48. The University of Illinois at Urbana-Champaign is a large research university, and our Civil and Environmental Engineering department performs roughly $15,000,000 of research annually. The department offers graduate studies in seven areas of specialization as well as joint master’s programs with business administration and architecture.

Construction Management
Construction Materials
Environmental Engineering and Environmental Science
Geotechnical Engineering
Environmental Hydrology and Hydraulic Engineering
Structural Engineering
Transportation Engineering
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<td><strong>CEE Graduate Student Blog</strong></td>
<td><strong><a href="http://uiuccee.typepad.com/gradblog/">http://uiuccee.typepad.com/gradblog/</a></strong></td>
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<td>Civil and Environmental Engineering Dept.</td>
<td><a href="http://cee.illinois.edu/">http://cee.illinois.edu/</a></td>
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<td>Housing</td>
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<td>Registration Checklist</td>
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<td>Student Health Insurance</td>
<td><a href="http://www.si.uiuc.edu">http://www.si.uiuc.edu</a></td>
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<td>Student Rights and Responsibilities</td>
<td><a href="http://www.admin.uiuc.edu/policy/code/index.html">http://www.admin.uiuc.edu/policy/code/index.html</a></td>
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<td>Tuition and Fee Rates</td>
<td><a href="http://www.registrar.illinois.edu/financial/tuition.html">http://www.registrar.illinois.edu/financial/tuition.html</a></td>
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<td>University Student Financial Services &amp; Cashier Operations</td>
<td><a href="http://www.usfsco.uillinois.edu">http://www.usfsco.uillinois.edu</a></td>
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**FREQUENTLY ASKED QUESTIONS**

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
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<tbody>
<tr>
<td>How do I receive information from the department?</td>
<td>Important announcements are posted on the Grad Blog. Check the <a href="uiuc.edu/gradblog">Grad Blog</a> frequently! If you still have questions, ask Mary Pearson in 1108 NCEL.</td>
</tr>
<tr>
<td>Who is my advisor?</td>
<td>If you haven’t made some prior arrangement with a professor, the faculty member in your area who is currently handling graduate admissions will assign you an advisor. If you can’t determine who that is, check with Mary Pearson in 1108 NCEL.</td>
</tr>
<tr>
<td>Why do I need to see an advisor?</td>
<td>All students, but particularly new students, should select courses in consultation with their advisor in order to avoid inappropriate selections or selections which would lead to delays in the student’s academic progress.</td>
</tr>
<tr>
<td>When is Newmark (NCEL) open?</td>
<td>The building is open 7 AM to 5 PM Monday through Friday.</td>
</tr>
<tr>
<td>Can I get a key to the building?</td>
<td>Keys are only given to employees (RA’s, TA’s, etc.).</td>
</tr>
<tr>
<td>Can I get a desk in Newmark?</td>
<td>Mail boxes and desks are provided for all that have fellowships, research and teaching assistantships. Generally the department cannot provide desks or mailboxes to graduate students who do not have such appointments. Check with your advisor.</td>
</tr>
<tr>
<td>Is there a student lounge?</td>
<td>The Yeh Student Center and there is a lounge in the basement of Newmark Lab</td>
</tr>
<tr>
<td>When can I meet with Mary Pearson to discuss questions I have about my graduate program?</td>
<td>Mary’s “walk-in” office hours are, Monday – Friday 10:00 – 12:00 1:00 – 4:00</td>
</tr>
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## DEPARTMENTAL RESOURCES AND KEY PEOPLE

<table>
<thead>
<tr>
<th>Service</th>
<th>Resource Person</th>
<th>Office</th>
<th>Telephone (area code 217)</th>
<th>Email</th>
</tr>
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<tr>
<td>Academic Records</td>
<td>Mary Pearson</td>
<td>1108 NCEL</td>
<td>333-3811</td>
<td><a href="mailto:mkpearso@illinois.edu">mkpearso@illinois.edu</a></td>
</tr>
<tr>
<td>Admissions Records</td>
<td>Mickey Peyton</td>
<td>1107 NCEL</td>
<td>333-6636</td>
<td><a href="mailto:mpeyton@illinois.edu">mpeyton@illinois.edu</a></td>
</tr>
<tr>
<td>CEE Copy Shop</td>
<td>Jerri Lyn Beck</td>
<td>1126 NCEL</td>
<td>333-6925</td>
<td><a href="mailto:cecopyshop@illinois.edu">cecopyshop@illinois.edu</a></td>
</tr>
<tr>
<td>Employment Records</td>
<td>Sheree Waltz</td>
<td>1104 NCEL</td>
<td>244-6163</td>
<td><a href="mailto:swaltz@illinois.edu">swaltz@illinois.edu</a></td>
</tr>
<tr>
<td>Graduate Officer</td>
<td>Albert Valocchi</td>
<td>1110 NCEL</td>
<td>265-0630</td>
<td><a href="mailto:valocchi@illinois.edu">valocchi@illinois.edu</a></td>
</tr>
<tr>
<td>Keys</td>
<td>Bobbi Vance</td>
<td>B106a NCEL</td>
<td>333-6418</td>
<td><a href="mailto:bvance@illinois.edu">bvance@illinois.edu</a></td>
</tr>
<tr>
<td>Machine Shop</td>
<td>Tim Prunkard</td>
<td>1135 NCEL</td>
<td>333-6913</td>
<td><a href="mailto:prunkard@illinois.edu">prunkard@illinois.edu</a></td>
</tr>
<tr>
<td>Secretary to Head of Department</td>
<td>Rhonda Powell</td>
<td>1114 NCEL</td>
<td>333-6378</td>
<td><a href="mailto:rpowell@illinois.edu">rpowell@illinois.edu</a></td>
</tr>
<tr>
<td>Structural Research Laboratory</td>
<td>Tim Prunkard</td>
<td>1135 NCEL</td>
<td>333-6913</td>
<td><a href="mailto:prunkard@illinois.edu">prunkard@illinois.edu</a></td>
</tr>
<tr>
<td>Thesis Format Check</td>
<td>Mary Pearson</td>
<td>1108 NCEL</td>
<td>333-3811</td>
<td><a href="mailto:mkpearso@illinois.edu">mkpearso@illinois.edu</a></td>
</tr>
<tr>
<td></td>
<td>Mickey Peyton</td>
<td>1107 NCEL</td>
<td>333-6636</td>
<td><a href="mailto:mpeyton@illinois.edu">mpeyton@illinois.edu</a></td>
</tr>
<tr>
<td>Graduate Student Advisory Committee, Co-Chairs</td>
<td>John Atkinson</td>
<td>4140 NCEL</td>
<td>333-1539</td>
<td><a href="mailto:jdatkins@illinois.edu">jdatkins@illinois.edu</a></td>
</tr>
<tr>
<td></td>
<td>Jacob Henschen</td>
<td>2145 NCEL</td>
<td>333-6958</td>
<td><a href="mailto:jhensche@illinois.edu">jhensche@illinois.edu</a></td>
</tr>
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</table>
PROFESSIONAL CONDUCT AND ACADEMIC INTEGRITY

Responsible professional conduct and academic integrity are essential for maintaining the high quality of education and research in the Department. Faculty and graduate students must conduct themselves in a professional and collegial manner in all dealings with each other. Graduate students holding TA or RA appointments should work together with their supervisors to develop a plan, based on reasonable expectations of student productivity, to involve an amount of effort commensurate with the percentage time of the appointment. For further useful information, consult the campus' official statement on “Responsible Professional Conduct: Guidelines for Teaching, Research, and Service,” available at http://wwwahruiuceduahrhandbookchap5/.

The faculty of the Department of Civil and Environmental Engineering expects all students to maintain academic integrity at all times in the classroom and the research laboratory and to conduct their work in accordance with the highest ethical standards of the engineering profession. The basic campus policies and definitions regarding Academic Integrity in course work are presented in the Student Code, Article 1, Part 4. (www.admin.uiucedu/policy/code/index.html).

All members of the university community are expected to adhere to the highest standards of academic integrity and ethical behavior in research and publications. The official university statement is on line at wwwresearchuiuceduai/. Further definitions and information are provided in the Graduate College Handbook for Students, Faculty and Staff (http://wwwgradillinoisedu/gradhandbookchapter1)

Additional helpful information about academic integrity and plagiarism is at wwwlibraryuiucedulearnresearchacademicintegrityhtml.

It is expected that all graduate students in the Department will read and understand these campus policies.

IMPORTANT: All new Ph.D. students and M.S. thesis students are required to complete on-line training modules in Responsible Conduct of Research (RCR). Further information will be available at the beginning of the Fall semester.
REGISTRATION AND PROGRAMS OF STUDY

Registration.  Important dates and deadlines are announced in the Graduate College Calendar (http://illinois.edu/calendar/Calendar?calId=524).  Registration is carried out using the U of Illinois at Urbana-Champaign Enterprise Applications - Student Self-Service registration system (https://apps.uillinois.edu/selfservice/index.html).  Fall semester instruction begins in late August and the semester terminates in mid-December.  Spring semester instruction begins in the third week of January, and the semester terminates in early May.  The summer session generally extends from approximately May 15 through August 1.  Classroom instruction normally occurs during the 8-week session which begins around June 10.

Advisors.  All graduate students are assigned an academic advisor who assists in planning and carrying through a program of graduate work, which fits their needs and satisfies departmental and Graduate College requirements.  The academic advisor for research assistants is normally the staff member in charge of each assistant’s research program.  Please make sure that the name of your advisor is communicated to student records (Mary Pearson) in 1108 NCEL.  New graduate students must see their advisor before they will be permitted to register.

Course Credit.  Graduate credit is measured in terms of hours.  The normal program for a full-time graduate student is twelve hours each fall and spring semester.  The normal program for an eight-week summer session is 4 hours, with 10 hours being the maximum permitted.  The amount of credit which may be earned in individual courses is indicated in the course listing provided later in this document.  Please refer to the course information for details.

For more information about course loads, please see the Graduate College Handbook for Students, Faculty and Staff, Chapter II:  http://www.grad.illinois.edu/gradhandbook/chapterII

CEE 597 Independent Study.  To help minimize problems associated with execution of an independent study, each student must submit an Independent Study Application/Approval Form.  This form includes a description of the independent study and requires the signature of the instructor, the student’s advisor, and a department officer (generally the associate head of the department).  The form can be obtained at 1108 Newmark.  No more than 8 hours of CEE 597 credit can be counted toward either the M.S. or the Ph.D. program.

Work Completed Elsewhere.  A student who has completed graduate work at an accredited institution within the past five years with a grade of A or B may petition that the credits be applied toward the M.S. degree at THE UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN.  A petition for transfer of credit can be made only after the student has successfully completed at least 8 hours of graduate work on the Urbana-Champaign campus.  Supporting information, including transcripts of the work in question must be supplied.  Generally, a maximum of 12 semester hours of transfer credit may be counted toward a master’s degree.  The acceptance of credit for work completed elsewhere does not reduce the 16 hour residency requirement.  Upon recommendation of the department, the Graduate College may permit a student to register in absentia for work at a laboratory elsewhere that offers facilities not available in the Urbana-Champaign area.  Such work is accepted for graduate credit if it is completed satisfactorily.  Course work is only allowed to be transferred for the Ph.D. upon approval by the CEE Director of Graduate Studies.

Miscellaneous Courses.  A student carrying a normal graduate program may elect, in addition, one miscellaneous course (a course which does not give credit toward an advanced degree).  If a graduate student enrolls for more than one miscellaneous course, he/she may not register for a full graduate program.  Courses intended to teach graduate students a reading knowledge of French, German, or Russian are regarded as miscellaneous courses.  A student who elects a miscellaneous course is required
to register in it and do the assigned work. Any undergraduate course taken for credit (A-F) will count
toward the GPA, but not toward the graduate credit requirements.

**Auditing Privileges.** A graduate student may, with the instructor’s permission, attend as an auditor,
provided a Visitor’s Permit bearing the approval of the instructor and the Dean of the college offering the
course is filed with the Records Section of the Office of Admissions and Records by the 10th day of class;
a $15 fee is required. The Visitor’s (Auditing) Permit can be found at [www.grad.uiuc.edu/forms/](http://www.grad.uiuc.edu/forms/).
Auditing is not permitted for laboratory courses. The student may not take the same course at a later date
for credit. A student may “sit in” rather than officially audit a class if the instructor approves such an
arrangement. Having audited a course will appear on the student’s transcript, but simply “sitting in” will
not.

**Graduate Programs for Employed Students.** A student who is employed cannot expect to complete the
academic work as promptly as one who devotes full time to his/her academic program. The academic
work carried by assistants and others on the University staff is limited by statute. Those employed
outside the University are expected to reduce their programs of work in accordance with these
regulations.

**Full-Time Course of Study for Graduate Students.** Graduate students may be required to maintain
full-time enrollment for several reasons. Many academic programs require registered students to maintain
a full-time load. Full-time status may also be required for certification related to student loans, fellowship
and traineeship appointments, and certain types of non-University medical insurance policies.
International students may be required to maintain full-time status for purposes of Student Exchange and
Visitor Information System (SEVIS) reporting.

Graduate students with 25%-67% assistantships, except Fellows (see below)

- Fall and spring terms: a minimum of 8 graduate hours; individual programs may set higher
  requirements.
- Summer term: a minimum of 4 graduate hours in thesis credit or a course that meets for at least
  eight weeks (enrollment in a four-week course in the summer term will not fulfill the requirement
  for full-time registration)

Graduate students with traineeships or waiver-generating fellowships (regardless of whether the student
holds a concurrent assistantship) and graduate students with "stand-alone" tuition waivers

- Fall and spring terms: a minimum of 12 graduate hours
- Summer term: a minimum of 4 graduate hours in thesis credit or a course that meets for at least
  eight weeks (enrollment in a four-week course in the summer term will not fulfill the requirement
  for full-time registration)

Graduate students with 1%-24% assistantships and graduate students without assistantships

- Fall and spring terms: a minimum of 12 graduate hours
- Summer term: a minimum of 6 graduate hours in thesis credit or a course that meets for at least
  eight weeks (enrollment in a four-week course in the summer term will not fulfill the requirement
  for full-time registration)

For more information about credit loads, please see the Graduate College Policies and Procedures
webpage at [http://www.grad.illinois.edu/policies/fulltime](http://www.grad.illinois.edu/policies/fulltime).

**Programs of Study.** Students’ courses and research are planned with their advisors. Consideration is
given to previous academic training, career objective, and the general requirements of the Graduate
College and the Department of Civil and Environmental Engineering. The student should become familiar with these requirements and satisfy them as soon as possible.

**Graduate Study in the Summer.** A limited number of Civil and Environmental Engineering graduate courses are offered during the summer session. The courses offered vary from summer to summer, so it is possible to complete only part of the requirements for the master’s degree by summer study and make progress toward the doctor’s degree. It is *not* possible to obtain a doctoral degree in Civil and Environmental Engineering by attending only summer sessions.

The number of hours of M.S. and Ph.D. thesis enrollment is one of the major sources of information used to assess the contribution of faculty and departments to the graduate research mission of the campus. Therefore, if a faculty member and a graduate student are engaged in thesis-related research in the summer, it is only fair that the faculty member and the department receive credit for this activity. For this reason, the department strongly recommends that students who are working on their M.S. or Ph.D. research and are supported by research assistantships register for a minimum of 4 hours of thesis research. However, the student should consult with their advisor regarding registration for thesis credit in the summer.

This policy only applies to students with a summer research assistantship appointment of at least 50%. There may be valid circumstances when this policy can be waived. Students should consult Graduate Director A.J. Valocchi if they have any questions.

**Grades.** A minimum grade-point average (GPA) of 2.75 is required for a student to be certified by the department and the Graduate College as eligible to receive an advanced degree. GPA is based on a system where A = 4, B = 3, etc. Included in the GPA computation are all hours with grades of A through F. Excluded from the computation are all semester hours with grades of Excused, Deferred, Satisfactory, Unsatisfactory, Pass, Fail, Credit-No-Credit, Withdrawn, and work not completed on the Urbana-Champaign Campus. A student with a GPA of less than 2.75 will be sent a warning letter by the Graduate College with a copy to the department. A student who has received a warning letter and who has not raised his GPA to 2.75 by the end of the next semester will not be permitted to register without the permission of the department and the Graduate College. Students with a GPA below 2.75 are not eligible for a degree. The current Illinois grading system is available online at [http://www.grad.illinois.edu/gradhandbook/chapterIII](http://www.grad.illinois.edu/gradhandbook/chapterIII).

**Credit/No Credit Grading Option.** With the approval of the student’s advisor and the completion of a credit/no credit option form, courses may be taken on a credit/no credit basis. In general, advanced level courses in the student’s major field must be taken for a letter grade. For each 4 hours taken credit/no credit, 12 hours must be taken for grades on the Urbana-Champaign Campus. Students are permitted to elect this non-grade option through the last day allowed for dropping a course without academic penalty. Forms are available from Mary Pearson in 1108 Newmark. A student may cancel this option by filing an amended request by the deadline date for dropping a course without academic penalty, as indicated in the Graduate College Calendar. All students and advisors are cautioned, with respect to the credit/no credit option, that until other universities throughout the country adopt a similar basis, students having a large number of non-graded courses may not receive adequate consideration for national awards or fellowships or postdoctoral positions at other institutions.

**Petitions.** A student may petition for exceptions to various academic and administrative requirements to the Dean of the Graduate College, but he or she should do so only after consultation with his/her advisor and with the recommendation of the department. Graduate Student Petition forms may be secured in 1108 NCEL or on the web at [http://www.grad.illinois.edu/petitions](http://www.grad.illinois.edu/petitions).

**Grievances:** Any graduate student in the Department of Civil and Environmental Engineering may informally pursue or formally file a grievance when he/she believes that a decision or behavior adversely affects his/her status as a graduate student. The grievance policy and procedures of the Department of
Civil and Environmental Engineering are stated in Appendix 1. The purpose of this policy is to protect the interests of graduate students in the Department of Civil and Environmental Engineering by providing informal and formal means of seeking resolution in case of an inappropriate action of a member of the faculty or administrative staff or an inappropriate application of departmental procedures. In the Department of Civil and Environmental Engineering, the student grievance committee is the Graduate Affairs Committee, which oversees all matters relating to the graduate programs.

**CEE Grad Blog.** Important notices and information of value to the graduate student are posted on the CEE Grad Student Blog ([uiuccee.typepad.com/gradblog/](http://uiuccee.typepad.com/gradblog/)). In general, we do not send notices by email. Check the CEE Grad Blog every day!
THE DEGREE OF MASTER OF SCIENCE (MSCE, MSEE and MSES)

Credit Requirements. All candidates for the degree Master of Science in Civil Engineering, Master of Science in Environmental Engineering or Master of Science in Environmental Science (MSCE, MSEE, or MSES) are required to consult their advisor. In all programs, at least 16 hours of credit must be in the student’s major field. Also, 12 hours of credit must be obtained for courses numbered in the 500 series, and eight of these twelve 500 level hours must be taken for grades in the major field. No more than four of these eight hours can be CEE597 Independent Study.

Thesis Option: A candidate for the MSCE, MSEE or MSES degree who is required or elects to write a thesis must complete at least 32 hours of graduate work (including CEE 599 thesis credit). A typical master’s program with a thesis includes 24 hours of course work and 8 hours of CEE 599 thesis credit. No more than 12 hours of CEE 599 thesis credit can be devoted to the M.S. thesis.

No Thesis Option: A candidate for the MSCE, MSEE or MSES degree who is not required or elects not to write a thesis must complete at least 36 hours of course work. Special requirements of the several areas of CEE are summarized in Appendix 2. Students wishing MSCE programs that cannot be accomplished in any of the eight areas of specialization may submit their proposed plan of study directly to the Graduate Affairs Committee for approval. See Mary Pearson in 1108 NCEL.

Residency and Time Requirements. At least one-half of the minimum hours required for the MSCE, MSEE, MSES degrees must be for courses meeting on the Urbana-Champaign Campus, or in courses meeting in other locations approved by the Graduate College for residence credit. A candidate for the master’s degree must complete all requirements for the degree within five calendar years after initial registration in the Graduate College.

Foreign Language. There is no foreign language requirement for the M.S. degree.

Thesis. Credit for thesis research (CEE 599) cannot be applied to a degree unless a thesis is submitted. The thesis must be the work of a single author. For instructions regarding the format of the thesis, the student should look at the Graduate College website for Thesis and Dissertation at http://www.grad.illinois.edu/thesis-dissertation. The format of all theses must be officially checked by the department. Ms. M. Pearson in 1108 NCEL and Ms. S. Hale in 3129 NCEL are authorized to perform the departmental format check.

Switching from 32 hour to 36 hour MSCE Program. Problems arise when an M.S. student decides at the last minute not to do an M.S. thesis and to switch from a 32 hour program with a thesis to a 36 hour program without a thesis MSCE degree. CEE Policy: Students will not be allowed to switch if the student’s advisor does not provide written consent.

Changing Areas of Specialization. M.S. candidates wishing to transfer from one departmental area of specialization to a new area must have their credentials transmitted to the new area for review. If the new area accepts the transferring student, then the student may continue and complete his/her M.S. program in the new area. See Mary Pearson in 1108 NCEL.

Second MSCE Degree. The University of Illinois at Urbana-Champaign policy prohibits awarding second degrees in the same area of specialization.

CEE Policy: Except under unusual circumstances, a second M.S. degree is not permitted if the student is admitted into the Ph.D. program using the first M.S. degree as fulfilling the requirements for Phase I of that program. A second M.S. degree may be permitted if the student is admitted into the CEE MSCE
program because the first degree is insufficient for some reason. In any case, the second (Illinois) MSCE degree course work should not duplicate the course work of the student’s first MSCE degree.

**Graduation.** Students are responsible for notifying the Graduate College of their intention to graduate in a given semester; that is, students are responsible for placing their names on the “degree list.” Students may use the U of Illinois at Urbana-Champaign Enterprise Applications - Student Self-Service system (https://apps.uillinois.edu/selfservice/index.html) to place their name on the graduation list by the stated deadline.
THE DEGREE OF DOCTOR OF PHILOSOPHY (Ph.D.)

The degree of Doctor of Philosophy, primarily a research degree, is offered in the fields of civil engineering and environmental engineering or science in civil engineering.

Residence and Credit Requirements. The doctoral program consists of three stages: see Fig. 1.

FIG. 1. The three stages of the University of Illinois at Urbana-Champaign Ph.D. degree program. After the receipt of an M.S. degree (Stage I), the student is considered to be an aspirant to the Ph.D. degree program (continuation of Stage I) but is not officially admitted to the program (Stage II) until the student has satisfied the area qualification procedures: see Table 1 for a description of Area Qualification Procedures. A minimum of 96 hours of credit are required, 64 of which must be in residence.

At least two of these stages must be completed in residence; the residence period must include two successive semesters in the second or the third stage.

- The first stage is completed when the candidate has received a master’s degree or has earned the equivalent number of credits AND has satisfied the area’s qualification procedures.
- The second stage consists of completion of a minimum of 32 additional hours of graded course work, beyond the M.S. requirements, fulfillment of departmental requirements, including language requirement, if any, and passing the preliminary examination.
The third stage is devoted to research and seminars with a minimum of 32 hours of thesis credit, preparation of the dissertation, and the final examination; courses may be taken during this period as well.

During all three stages the student is expected to register for a full program, or if employed, for the normal credit allowed under the terms of the appointment. It is possible to complete these stages in three years if the student devotes full time to his/her academic program. A candidate for the Ph.D. degree must complete all requirements for this degree within seven calendar years after initial registration in the Graduate College, except as noted in the following. A candidate for the doctorate who has received a master’s degree elsewhere must complete all requirements for the degree within six years after initial registration in the Graduate College. A student whose program of study is significantly interrupted after receiving a master’s degree from the University of Illinois and who later returns to work for the doctorate will have six years from the date of return to complete degree requirements. Please see the Graduate College Handbook, Chapter VI, Section E. Time Limits for more details (http://www.grad.illinois.edu/gradhandbook/chaptervi/section05).

Milestones and Schedule for Making Progress in the Ph.D. Program: The following table lists the significant steps that a student must complete during their Ph.D. program. A time schedule is also included, so that students can assess their rate of progress in the program. The maximum time limits are to ensure that students do not take an excessively long time to complete their degree. It is recognized that there are special circumstances, particularly with inter-disciplinary research, which may cause students to need some additional time. “Normal Progress” would apply to a student with a Fellowship or 50% Research Assistantship.

<table>
<thead>
<tr>
<th>Milestone</th>
<th>Normal Progress</th>
<th>Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Select research advisor (faculty signature on the 'yellow' form, “Application for Admission to Candidacy for the PhD in CEE”, see Appendix 4)</td>
<td>End of 1st semester</td>
<td>End of 2nd semester</td>
</tr>
<tr>
<td>Qualifying Exam</td>
<td>2nd semester</td>
<td>4th semester^</td>
</tr>
<tr>
<td>Complete key course work required for research</td>
<td>3rd – 4th semester</td>
<td>4th – 5th semester</td>
</tr>
<tr>
<td>Preliminary Exam</td>
<td>5th semester</td>
<td>6th – 7th semester</td>
</tr>
<tr>
<td>Final Examination</td>
<td>8th semester</td>
<td>6 years^</td>
</tr>
<tr>
<td>Thesis Deposit</td>
<td>8th semester</td>
<td>6 years^</td>
</tr>
</tbody>
</table>

^This limit is strictly enforced by the Department. All students must pass the Qualifying Examination within four semesters (2 years) of enrolling in the Ph.D. Program.

^See the Graduate College Handbook (http://www.grad.illinois.edu/gradhandbook/chaptervi/section05) for details. Students earning the MS here have a limit of 5 years, and students earning the MS at another institution have a limit of 6 years. Students who are making adequate progress can petition for a time extension.

Application for Admission to Candidacy for the Ph.D. and Area Qualification Procedures. Students wishing to work toward Civil and Environmental Engineering Ph.D. degrees must do two things: (1) formally apply for admission to the doctoral program, and (2) pass the qualification procedures set by their area of specialization. The department encourages students to apply for admission to the doctoral program as soon as possible after completing their M.S., or if the student obtained his/her M.S. degree elsewhere, as soon as possible after arriving at Illinois. Application for admission entails finding a faculty member who will agree to supervise the student’s doctoral program, obtaining that faculty member’s signature on a departmental doctoral program application form (Application for Admission to Candidacy for the Ph.D. in Civil and Environmental Engineering - see Appendix 4), and submitting this form to Mary Pearson in 1108 NCEL. Table 1 summarizes the doctoral candidate qualification procedures of each departmental area. Although each area has slightly different procedures and schedules, the
department requires that the qualifying procedure must be passed within two years of enrolling in the Ph.D. program.

In addition to the area qualifying procedures, there is a new interdisciplinary qualifying procedure available. Students must declare their intent to pursue the interdisciplinary qualifying procedure within the first year of the Ph.D. program. Students should consult with their advisor for further information.

A student is not permitted to attempt the qualifying procedure in more than one area.

If a student’s major research advisor is in another department or leaves the campus, a regular tenured or tenure-track CEE faculty co-advisor is required. If a student’s major research advisor is in another department or is a non-tenure track CEE faculty, a regular tenured or tenure-track CEE faculty must serve as the Chair of the Preliminary and Final Examination.

In general, students who are admitted to the Ph.D. program in our department must have an M.S. degree. In the rare event that a student is admitted directly to the Ph.D. program with a B.S. degree, then the student must complete courses to satisfy the Phase I course requirements.

A student who has been admitted to the Ph.D. program in our department is automatically awarded Phase I credit for his or her M.S. degree. This determination is made by the admissions committee at the time of application based on an evaluation of the courses taken for the M.S. degree (i.e., area is not determined simply from the name of the department or degree). Except in very rare cases, the existing M.S. degree will be in the same area as the Ph.D. sought by the student because it is unlikely that a student would be admitted to the program without adequate training in that field. Hence, it is generally not possible to receive an M.S. from Illinois because the M.S. would duplicate the one for which Phase I credit was already awarded.

A student with an M.S. degree from another institution can apply to the M.S. program in our department. If that student is admitted, it is with the understanding that the existing M.S. is not suitable for Phase I Ph.D. credit. In essence, admission to the M.S. program automatically disqualifies prior course work at other institutions from serving as Phase I Ph.D. credit. Hence, a subsequent petition to have courses which were taken for the M.S. at Illinois to count as Phase II credit for the Ph.D. would be denied because the first M.S. is not adequate for Phase I credit.

**Language Requirement.** There is no department-wide foreign language requirement; however, the faculty of some areas of specialization may require foreign language proficiency, if essential to the conduct of research in that area.

**Annual Review of Progress.** All Ph.D. students are required to meet with their advisor for a formal annual review. The student and the advisor must complete the “Annual Ph.D. Candidate Adviser Conference” form, which can be obtained from Mary Pearson in 1108 NCEL. A copy of the form is in Appendix 3. This form must be returned completed to Mary Pearson each spring semester. Students will not be permitted to register for the fall semester until they have turned in this form. The annual review helps the student to progress successfully through the Ph.D. program by allowing timely identification of deficiencies, clarifications of expectations for academic performance, and identification of opportunities for improvement. Students need to be making satisfactory academic progress to continue in the Ph.D. program.

**Preliminary Examination.** A candidate for the Ph.D. degree must pass a preliminary examination to test his/her knowledge of the major and minor fields of study. The student/advisor must submit a Request for Appointment of Doctoral Committee form to set up the Preliminary Examination Committee at least three weeks prior to the scheduled exam date. The advisor must sign and date the form.
Graduate College policy states, “The preliminary examination committee is appointed by the dean of the Graduate College, upon recommendation of the unit executive officer. It must include at least four voting members, three of whom must be members of the Graduate Faculty and two of whom must be tenured.” “Committee members should be chosen for their expertise in the student’s research area, but may also be chosen to give diversity in viewpoint, methodology, or academic discipline.”

In CEE, the preliminary examination committee is normally the same as the final examination committee.

**Work in Absentia.** A student, who has passed the preliminary examination, has completed the credit requirements for the doctoral degree, is making no use of University facilities and has left the campus, is not required to register each semester. However, the student must be registered during the term in which the final examination is taken, including the summer session. If more than two years has elapsed since the last semester in which the student was registered, the student must petition for re-admission. A student not on campus can register in absentia during a term in which that student does not expect to receive a degree. Petitions for in absentia registration will usually be approved if the student has completed 64 hours of residence credit, passed the preliminary examination, and not exceeded the time limit for the degree. If a student does not complete the degree requirements within five years after passing the preliminary examination, a second preliminary examination is required. This does not alter the time limit for the advanced degree as previously described.

**Thesis.** The degree of Doctor of Philosophy is primarily a research degree and consequently the candidate must demonstrate a capacity for independent research by preparing an original thesis topic within the chosen field of study. The subject of the thesis must be reported to the doctoral committee and to the Graduate College at the time of the preliminary examination. The format of all theses must be officially checked by the department. Ms. M. Pearson in 1108 NCEL and Ms. M. Peyton in 1107 NCEL are authorized to perform the departmental format check. When the credit requirement is satisfied (32 hours of Ph.D. thesis research), the student may maintain his/her status as a candidate by registering for zero credit in Thesis Research (CEE 599) until completion of the thesis. However, the student should register for the number of hours indicative of the demands placed on the advisor. This applies to both resident and in absentia students. Directions regarding thesis form and style are given on the web at [http://www.grad.illinois.edu/thesis-dissertation](http://www.grad.illinois.edu/thesis-dissertation). Arrangements for preparing the thesis should be checked with the student’s advisor and the Graduate College Thesis Office ([http://www.grad.uiuc.edu/thesis-dissertation](http://www.grad.uiuc.edu/thesis-dissertation)).

**Final Examination.** After the credit requirements for the third stage and the thesis have been completed, the candidate is admitted to the final examination upon recommendation of his/her advisor. Final examinations are oral and public. A student who has failed to maintain high standards of scholarship and research will be refused admission to the final examination. Although the examination is concerned primarily with the research accomplished by the student as described in his/her thesis, it may extend over the candidate’s whole field of study. Any changes in the members of a student’s final Ph.D. committee require the major advisor to notify all committee members (including those dropped from or added to the committee) by email. Please send a copy of the email to Mary Pearson (mkpearso@illinois.edu). Also, the major advisor must sign and date the revised Request for Appointment of Doctoral Committee form.

**Graduation.** Students are responsible for notifying the Graduate College of their intention to graduate in a given semester; that is, students are responsible for placing their names on the “degree list.” Students may use the U of Illinois at Urbana-Champaign Enterprise Applications - Student Self-Service system ([https://apps.uislinois.edu/selfservice/index.html](https://apps.uislinois.edu/selfservice/index.html)) to place their name on the graduation list by the stated deadline.
<table>
<thead>
<tr>
<th>Area</th>
<th>Area Doctoral Candidate Qualification Procedures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction Management</td>
<td>Students may apply to become a doctoral candidate in the construction management area after having received a Master's degree and after having completed an additional 8 hours of study at Illinois. The student must first find a faculty member (advisor) willing to supervise his/her doctoral studies. Upon receiving an application to the Ph.D. program, the student’s advisor will form a committee of construction management and other appropriate faculty members to review the student’s qualifications. At a meeting of this committee, the student’s records, including courses and grades at the Illinois, will be reviewed, and the student will be asked to make an oral presentation of previous research or scholarship such as the results of his/her Master’s thesis or a special project.</td>
</tr>
<tr>
<td>Construction Materials</td>
<td>Students must apply to become a doctoral candidate in the construction materials area during the first 12 months after being accepted into the Ph.D. program in the Department of Civil and Environmental Engineering and after completing at least four 400- or 500-level courses, two in construction materials and two in the engineering behavior of materials. A GPA of 3.5 or greater is required. One of the construction materials faculty must consent to serve as advisor; the student must submit to this advisor a written request for admission to the Ph.D. program, and the student's qualifications will then be reviewed by the construction materials faculty. For more information, please see your advisor and the construction materials web site at <a href="http://consmtls.cee.illinois.edu/">http://consmtls.cee.illinois.edu/</a>.</td>
</tr>
<tr>
<td>Environmental</td>
<td>Students must take a qualifying examination after core courses have been completed and their specialty area chosen. For students who have obtained their Master’s degree in our department, this examination can be taken within less than one year after the Master’s degree. For students obtaining their degree from another university, this examination can be taken one year after the Master’s degree. The examination includes three one-half day written exams and a follow-up oral exam. All faculty members in the environmental area review the written examination and participate in the grading decision.</td>
</tr>
<tr>
<td>Geotechnical</td>
<td>Students may apply to become a doctoral candidate in the geotechnical area only after having completed 24 hours of graduate study at Illinois. Upon receiving an application to the Ph.D. program, the student’s academic advisor will arrange a meeting of the geotechnical faculty. At this meeting, the student’s records, including courses and grades at Illinois are reviewed.</td>
</tr>
<tr>
<td>Environmental Hydrology and Hydraulic Engineering</td>
<td>Students may apply to become a doctoral candidate after having completed two semesters of study at Illinois. Students earning their M.S. degrees at Illinois in the environmental hydrology and hydraulic engineering area are STRONGLY ENCOURAGED to apply to become a doctoral candidate within one year after earning their M.S. degree. Students earning their M.S. degrees from other institutions are required to apply to become a doctoral candidate within two years after the start of their study at Illinois. Approval of the faculty is based upon performance in courses and in a week-end-long, take-home, written qualifying examination.</td>
</tr>
<tr>
<td>Structural</td>
<td>Students must take a written qualifying examination that covers five core areas of structural engineering: matrix structural analysis, structural dynamics, structural mechanics, concrete structures and steel structures. Please refer to the structural engineering web site for the most current doctoral qualification procedures: <a href="http://structures.cee.illinois.edu/phd">http://structures.cee.illinois.edu/phd</a>.</td>
</tr>
<tr>
<td>Transportation</td>
<td>Students must complete the qualifying examination no later than the end of the third semester of their doctoral program. The student submits transcripts, a one-page statement of course of study objectives including a tentative course plan, and a candidacy form to the examining committee members. The student must have a minimum University of Illinois grade point average of 3.5 out of 4.0 to qualify for the exam. The qualifying exam is a two-hour oral examination, with provision for a written examination. Please consult with your advisor. Please refer to the transportation web site at: <a href="http://cee.illinois.edu/TransEng">http://cee.illinois.edu/TransEng</a>.</td>
</tr>
</tbody>
</table>
SPECIAL GRADUATE DEGREE PROGRAMS AND OPTIONS

Computational Science and Engineering (CSE) Option. The Department of Civil & Environmental Engineering offers an option in Computational Science and Engineering (CSE) within the M.S. and Ph.D. program. The program requirements listed are in addition to the normal requirements for the M.S. and Ph.D. degree. See cs.engr.uiuc.edu/graduate/jprograms.php#M.S.CSE.

Joint Degree Program with Business Administration (MBA). This program is administered by the College of Commerce and Business Administration. Students must apply for admission to both the MBA program and to the Department of Civil and Environmental Engineering. The requirements for the MSCE degree in this joint program are 32 hours of course work including three 500 level courses in CEE. The student must be a student in the CEE Department for at least two semesters in order to obtain the joint degree. More information is available at http://www.mba.illinois.edu/academics/joint-degrees.aspx. The thesis option is not available for this joint degree program.

Master of Architecture and Master of Civil Engineering (Construction Management or Structural Engineering). This program is administered through the school of architecture and requires a baccalaureate in architectural studies. Thus, the program is intended for graduate students in architecture. The student must be a student in the CEE Department for at least two semesters in order to obtain the joint degree. More information about the M.Arch structures option can be found at http://structures.cee.illinois.edu/joint. Architecture also has information at arch.uiuc.edu/programs/degree/march/options/. The thesis option is not available for this joint degree program.
FINANCIAL AND OTHER ASSISTANCE

**Fellowships.** Fellowship stipends are awarded in recognition of scholarly achievement and promise and are intended to enable a student to pursue graduate study and research without requiring him or her to render any services. The stipends of different fellowships vary, and most include or are supplemented with a tuition and partial fee waiver. A fellow is required to pursue a full program of graduate study consistent with any assistantship appointment held. If a fellowship includes the summer months, the student must register for 4 hours during the summer session. Most fellows hold quarter-time teaching or research assistantships. The University adheres to the resolution adopted by the Council of Graduate Schools in the United States which provides that if the recipient of an award indicates his acceptance before April 15, he or she will have complete freedom through April 15 to resign in order to accept another appointment. After April 15, however, the recipient may not accept another award without obtaining a formal release from the first commitment. This resolution applies to the acceptance of research or teaching assistantships and fellowships.

**Departmental Recommendations for Fellows.** The department urges all students holding fellowships to engage in some form of research, either in association with one of the department’s formal research programs, or on a special research program with a faculty member. Fellows may arrange to write a master’s thesis (CEE 599), or write a comprehensive report on an individual investigation (CEE 597). This phase of the program provides the student with valuable training and serves as a guide to the department in making decisions about continuing studies and stipends. Second year fellows necessarily will be involved in research (and should be enrolled for credit accordingly) as a part of their doctoral study.

**University Fellowships.** These fellowships are based on academic and scholarly achievements, and are unrestricted as to the student’s field of graduate study.

**Graduate College Fellowships for Underrepresented Students.** These fellowships are intended to increase representation of a particular underrepresented minority group so designated such as women, African Americans, American Indians, Hispanics and others. Information can be obtained from the Graduate College at 201 Coble Hall, 801 S. Wright Street, Champaign, IL 61820.

**Industrial, Endowed, and Special Fellowships.** Various industrial firms, foundations, and private individuals have generously donated funds to support a number of special fellowships for graduate students. The stipends and supplemental allowances of these fellowships are not uniform, except that tuition and partial fees are usually provided.

**Tuition and Fee Waivers.** These awards, available in limited number, provide exemption from payment of tuition and some fees, for the academic year and the summer session. Students holding tuition and fee waivers must be in residence at the University and must register for at least 12 hours each semester during the academic year and 4 hours during the summer term. They may accept part-time or incidental employment not to exceed twenty hours a week. Employment may be at the University or elsewhere. Veterans who are admissible to a graduate program and who meet certain residency requirements may be eligible for exemption from tuition under the statute concerning military scholarships.

**Research Assistantships.** An assistant’s hours of work per week are reflected in their percentage of appointment. Time commitments are based on a 40 hour work week. Thus, a one-half (50%) time appointment requires an average of 20 hours per week. A quarter (25%) time appointment requires an average of 10 hours per week. Hours of work are separate and distinct from the time required for an assistant’s own academic course work. To receive and hold an assistantship, a student must be registered for the semesters of the appointment. The appointment will be in effect only while the student remains in good academic standing.
Students holding appointments ranging from 25 to 67 percent time (25 to 50 percent for international students) for at least three-fourths of the semester are exempt from tuition. The waiver of tuition includes payment of the service fee, and health service fee, along with basic dental and vision coverage and partial payment of the health insurance fee for each term of the appointment. The student is responsible for paying the balance of the health insurance and all other fees. Information about other fees for which you may be responsible can be found at [http://www.registrar.illinois.edu/financial/tuition.html](http://www.registrar.illinois.edu/financial/tuition.html). The tuition and service fee exemption extends through the summer appointment; however, students who hold summer appointments of less than 25 percent or more than 67 percent will be assessed tuition and fees.

For more information about Assistantship Policies, see the Graduate College Handbook: [http://www.grad.uiuc.edu/gradhandbook/chapterVIII/section01](http://www.grad.uiuc.edu/gradhandbook/chapterVIII/section01).

**Teaching Assistantships.** The department offers a limited number of teaching assistantships, which are usually filled by appointment of advanced-level graduate students whose competencies have been demonstrated. However, applicants who have particular interests and/or prior experience in teaching are encouraged to indicate this on their applications so that, when appropriate, consideration can be given to the possibility of an initial appointment as a teaching assistant. Applicants whose native language is not English are required to take an English Proficiency Interview (EPI) before they can be appointed as teaching assistants. If your native tongue is not English and if there is any possibility that you might become or want to become a teaching assistant, you should take the EPI ([http://cte.illinois.edu/testing/oral_eng/main.html](http://cte.illinois.edu/testing/oral_eng/main.html)). By law, the department cannot appoint students whose first language is not English to such positions without the student first demonstrating their fluency in English via the EPI. Test dates can be found at [http://cte.illinois.edu/testing/oral_eng/testdates.html](http://cte.illinois.edu/testing/oral_eng/testdates.html).

**Other Sources of Financial Aid.** A number of other sources of support are available, for example, fellowships offered by the National Science Foundation, the Ford Foundation, the American Institute of Steel Construction, and other organizations. Students are encouraged to apply for such stipends.

**Loan Funds.** Information may be requested about National Direct Student Loans, University of Illinois Long Term Loans (UILT) and College-Work Study from the Office of Student Financial Aid, Student Services Arcade Building, 620 E. John St., Champaign, Illinois 61820. The application period begins in January of each year; the priority deadline for applications is March 1. Loan and work-study applications are made separately from applications for fellowships, assistantships, or tuition and fee waivers. Graduate students may also apply for guaranteed loans through lenders in their hometowns who may participate in one of the various types of guaranteed loan programs. Applications should be submitted late in the spring term for the following academic year. Information brochures and application forms are available from the Office of Student Financial Aid. Students should identify themselves as graduate students when requesting an application or a brochure.

**The Writers' Workshop.** The Writers’ Workshop satellite location in 435 Grainger Library is available to assist undergraduate and graduate Engineering students with their written work, including class assignments, reports, theses, conference papers, resumes, and personal statements. The Workshop staff consists of expert writing teachers who can provide extensive feedback about the logic, format, and style of students' texts. If students are interested in this service, they should contact the Grainger Library satellite at (217)333-3576 to schedule an appointment.

**Graduate College Advising Services and Mentoring Resources.** The Graduate College offers advising walk-in hours and online resources in several areas to assist you with your academic and professional development needs. Good mentoring is a key element of graduate education. The Graduate College also provides some resources on finding mentors and fostering a productive relationship with your mentor(s). Information about advising and mentoring can be found at [http://www.grad.uiuc.edu/advising](http://www.grad.uiuc.edu/advising).
Counseling Center. The Counseling Center is located at 110 Turner Student Services Building, 610 East John Street, Champaign, 333-3704, http://www.counselingcenter.illinois.edu/. The Counseling Center is committed to providing a range of services intended to help students develop improved coping skills in order to address emotional, interpersonal and academic concerns. The Counseling Center provides individual, couples and group counseling, and all of these services are paid for through the Health Services Fee. The Counseling Center offers primarily short-term counseling, but we do provide referrals to the community when students could benefit from longer term services.
**GRADUATE-LEVEL COURSES**  [http://courses.illinois.edu/cis/index.html](http://courses.illinois.edu/cis/index.html)

**CEE 401 Concrete Materials**
Credit: 3 hours.
Examines the influence of constituent materials (cements, aggregates and admixtures) on the properties of fresh and hardened concrete; mix design handling and placement of concrete; and behavior of concrete under various types of loading and environment; test methods. Laboratory practice is an integral part of the course. Prerequisite: CEE 300.

**CEE 405 Asphalt Materials I**
Credit: 3 or 4 hours.
Properties and control testing of bituminous materials, aggregates for bituminous mixtures, and analysis and design of asphalt concrete and liquid asphalt cold mixtures; structural properties of bituminous mixes; surface treatment design; and recycling of mixtures. 3 undergraduate hours. 3 or 4 graduate hours. Prerequisite: CEE 310.

**CEE 406 Pavement Design I**
Credit: 3 or 4 hours.
Analysis, behavior, performance, and structural design of pavements for highways and airfields; topics include climate factors, rehabilitation, life cycle design economics, and traffic loadings. 3 undergraduate hours. 3 or 4 graduate hours. Prerequisite: CEE 310.

**CEE 407 Airport Design**
Credit: 3 or 4 hours.
Basic principles of airport facilities design to include aircraft operational characteristics, noise, site selection, land use compatibility, operational area, ground access and egress, terminals, ground service areas, airport capacity, and special types of airports. 3 undergraduate hours. 3 or 4 graduate hours. Prerequisite: Senior standing in civil engineering.

**CEE 408 Railroad Transportation Engineering**
Credit: 3 or 4 hours
Principles and analysis of railroad transportation efficiency, economics, energy, and engineering; effect on production and markets. Introduction to railroad infrastructure; locomotive and rolling stock design, function, and operation. Computation of train speed, power, and acceleration requirements; introduction to railway traffic control and signaling. Quantitative analytical tools for rail-transportation decision-making and optimization. Field trip to observe railroad infrastructure, equipment and operations. 3 undergraduate hours. 3 or 4 graduate hours. Prerequisite: CEE 310.

**CEE 409 Railroad Track Engineering**
Credit: 3 or 4 hours
In-depth examination of railroad track engineering concepts including track component and system design, construction, evaluation, maintenance, load distribution, and wheel-rail interaction. Design and analysis tools for railroad track engineering and maintenance. Field trip to observe railroad track system and components. 3 undergraduate hours. 3 or 4 graduate hours. Prerequisite: CEE 310.

**CEE 410 Railroad Signaling and Control**
Credit: 3 or 4 hours
Railway traffic control and signaling systems; train performance and scheduling tools; analysis of temporal and spatial separation of trains for safety and efficiency; train movement authority and operating rules, track circuit and wireless train position monitoring technology; interlocking design; railroad capacity modeling tools; economic analysis of traffic control system design, optimization, and selection. Field trip to observe signal system infrastructure and railway traffic operations control center. 3 undergraduate hours. 3 or 4 graduate hours. Prerequisite: CEE 408.

**CEE 411 RR Project Design & Constr**
Credit: 3 or 4 hours.
Critical elements in the development and planning of railroad construction projects; project economic justification; route alternative analysis procedures; cost estimation; site civil design; computer-aided track design; surveying; construction management; construction procedures for typical railroad projects. Design project covering a typical railroad capital construction projects. Field trip to observe the construction of a railroad capital project. 3 undergraduate hours. 3 or 4 graduate hours. Prerequisite: CEE 310.
CEE 415 Geometric Design of Roads  
Credit: 4 hours.  
Analysis of factors in developing a highway transportation facility; traffic estimates and assignment; problems of highway geometrics and design standards; planning and location principles; intersection design factors; street systems and terminal facilities; programming improvements; drainage design; structural design of surface; concepts of highway management and finance; and highway maintenance planning. Prerequisite: CEE 310.

CEE 416 Traffic Capacity Analysis  
Credit: 3 or 4 hours  
Study of fundamentals of traffic engineering; analysis of traffic stream characteristics; capacity of urban and rural highways; design and analysis of traffic signals and intersections; traffic control; traffic impact studies; and traffic accidents. 3 undergraduate hours. 3 or 4 graduate hours. Prerequisite: CEE 310

CEE 417 Urban Transportation Planning  
Credit: 4 hours.  
Role of transportation in urban development and planning; characteristics of urban-person transportation systems and methods of analysis and forecasting of urban-person transportation demand; transportation systems management and capital improvement programming; and emphasis on the needs and activities of metropolitan planning organizations. Same as UP 430.

CEE 420 Construction Productivity  
Credit: 3 or 4 hours.  
Introduction of the application of scientific principles to the measurement and forecasting of productivity in construction engineering. Conceptual and mathematical formulation of labor, equipment, and material factors affecting productivity. 3 undergraduate hours. 3 or 4 graduate hours. Prerequisite: CEE 320.

CEE 421 Construction Planning  
Credit: 3 or 4 hours.  
Project definition; scheduling and control models; material, labor, and equipment allocation; optimal schedules; project organization; documentation and reporting systems; and management and control. 3 undergraduate hours. 3 or 4 graduate hours. Prerequisite: CEE 320.

CEE 422 Construction Cost Analysis  
Credit: 3 or 4 hours.  
Introduction to the application of scientific principles to costs and estimates of costs in construction engineering; concepts and statistical measurements of the factors involved in direct costs, general overhead costs, cost markups, and profits; and the fundamentals of cost recording for construction cost accounts and cost controls. 3 undergraduate hours. 3 or 4 graduate hours. Prerequisite: CEE 320.

CEE 430 Ecological Quality Engineering  
Credit: 2 hours.  
Examines the characteristics of rivers and lakes which affect the management of domestic and industrial wastewaters; includes assessment of chemical hazards, and introduction to surveillance and biomonitoring, and a review of regulations governing effluents. Prerequisite: CEE 330.

CEE 431 Biomonitoring  
Credit: 3 hours.  
Discusses the theory and application of biomonitoring as a component of environmental management; reviews a range of techniques to analyze effluents and assess condition and trend in the environment, using biological and ecological systems; and emphasizes biomonitoring program design, selection and analysis of data, and interpretation of biomonitoring results. Prerequisite: CEE 430.

CEE 432 Stream Ecology  
Credit: 3 hours  
Description of physical, chemical, and biological characteristics in streams and rivers including an integrated study of the environmental factors affecting the composition and distribution of biota; emphasizes the application of ecological principles in aquatic ecosystem protection and management. Same as IB 450. Prerequisite: CEE 430.
CEE 434 Environmental Systems I
Credit: 3 hours
Introduction to the concepts and applications of environmental systems analysis. Application of mathematical
programming and modeling to the design, planning, and management of engineered environmental systems,
regional environmental systems, and environmental policy. Economic analysis, including benefit-cost analysis and
management strategies. Concepts of tradeoff, non-inferior sets, single- and multi-objective optimization. Practical
application to case studies to convey an understanding of the complexity and data collection challenges of actual
design practice. Prerequisite: CEE 201 or GE 330, CEE 330

CEE 436 Sustainable Urban Bldg Sites
Credit: 4 hours.
Identification of sustainability indicators, identification and design of sustainable technologies associated with water
and energy management for urban buildings, and sites, and acceptance evaluation of sustainable technologies from
technical, economic, and social perspectives using life cycle analysis. Sustainable technology applications to water
reuse, storm water management, alternative energy, energy conservation, and new building approaches and
materials. Design teams work together on homework assignments and final design project proposing a sustainable
redevelopment strategy for an urban building and the surrounding site. Prerequisite: CHEM 104 and MATH 231.

CEE 437 Water Quality Engineering
Credit: 3 hours
Fundamental theory underlying the unit processes utilized in the treatment of water for domestic and industrial
usage, and in the treatment of domestic and industrial wastewaters. Prerequisite: CEE 330; credit or concurrent
registration in TAM 335.

CEE 440 Solid and Hazardous Waste
Credit: 3 hours.
Investigation of the regulatory and technical issues affecting solid and hazardous waste management, with an
emphasis on the principles governing the transport, fate, and remediation of solid and hazardous waste in the
subsurface, including advection, dispersion, sorption, interphase mass transfer, and transformation reactions.
Prerequisite: CEE 330.

CEE 442 Env Eng Principles, Physical
Credit: 3 hours.
Analysis of the physical principles which form the basis of many water and air quality-control operations;
sedimentation, filtration, inertial separations, flocculation, mixing, and principles of reactor design. Prerequisite:
CEE 437.

CEE 443 Env Eng Principles, Chemical
Credit: 4 hours.
Application of principles of chemical equilibrium and chemical kinetics to air and water quality. Chemistry topics
are thermodynamics, kinetics, acid/base chemistry, complexation, precipitation, dissolution, and
oxidation/reduction. Many applications are also presented. Prerequisite: CEE 437.

CEE 444 Env Eng Principles, Biological
Credit: 4 hours.
Application of principles of biochemistry and microbiology to air and water quality, wastes, and their engineering
management; biological mediated changes in water and in domestic and industrial wastewater. Prerequisite: CEE
443.

CEE 445 Air Quality Modeling
Credit: 3 hours.
Overview of practical and advanced approaches to air pollution modeling, including aspects of pollutant transport,
transformation, and loss. Models considered include: Gaussian plume, chemical mass balance, chemical reaction,
grid and trajectory. Evaluation of models and the development of efficient control strategies are also discussed
Same as ATMS 425. Prerequisite: CEE 330 and credit or concurrent registration in TAM 335; or ATMS 401.

CEE 446 Air Quality Engineering
Credit: 3 hours.
Description and application of chemical and physical principles related to air pollutants, aerosol mechanics, attenuation of light in the atmosphere, air quality regulation, generation of air pollutants, methods to remove gaseous and particulate pollutants from gas streams, and atmospheric dispersion. Prerequisite: CEE 330; credit or concurrent registration in TAM 335.

CEE 447 Atmospheric Chemistry
Credit: 3 hours.
Course will present current knowledge of the biochemical cycles of atmospheric trace gases, their interactions on global and regional scales, and their significance for the chemistry in the atmosphere. The important fundamental concepts that are central to understanding air pollutants, e.g., the formation of aerosols and the transformation and removal of species in the atmosphere, will be introduced. Same as ATNS 429, and ENVS 450. Prerequisite: CHEM 104; either CEE 330 or ATMS 401.

CEE 449 Environmental Engineering Lab
Credit: 3 hours.
Combination of lecture and laboratory designed to provide exposure to the use of traditional analysis tools and techniques in analysis, control, and design of natural and engineered environmental systems including air, water, wastewater, solid and hazardous waste, and ecological systems 3 undergraduate hours. Prerequisite: CEE 437 or CEE 446.

CEE 450 Surface Hydrology
Credit: 3 hours.
Study of descriptive and quantitative hydrology dealing with the distribution, circulation, and storage of water on the earth's surface; discusses principles of hydrologic processes and presents methods of analysis and their applications to engineering and environmental problems. Prerequisite: CEE 350.

CEE 451 Environmental Fluid Mechanics
Credit: 3 hours.
Incompressible fluid mechanics with particular emphasis on topics in analysis and applications in civil engineering areas; primary topics include principles of continuity, momentum and energy, kinematics of flow and stream functions, potential flow, laminar motion, turbulence, and boundary-layer theory. Prerequisite: TAM 335.

CEE 452 Hydraulic Analysis and Design
Credit: 3 hours.
Hydraulic analysis and design of engineering systems: closed conduits and pipe networks; hydraulic structures, including spillways, stilling basins, and embankment seepage; selection and installation of hydraulic machinery. Prerequisite: TAM 335.

CEE 453 Urban Hydrology and Hydraulics
Credit: 4 hours
Hydraulic analysis and design of urban, highway, airport, and small rural watershed drainage problems; discussion of overland and drainage channel flows; hydraulics of storm-drain systems and culverts; determination of design flow; runoff for highways, airports, and urban areas; design of drainage gutters, channels, sewer networks, and culverts. Prerequisite: CEE 350.

CEE 457 Groundwater
Credit: 3 hours.
Physical properties of groundwater and aquifers, principles and fundamental equations of porous media flow and mass transport, well hydraulics and pumping test analysis, role of groundwater in the hydrologic cycle, groundwater quality and contamination. Prerequisite: CEE 350 and TAM 335.

CEE 462 Steel Structures II
Credit: 3 or 4 hours.
Metal members under combined loads; connections, welded and bolted; moment-resistant connections; plate girders, conventional behavior, and tension field action. 3 undergraduate hours. 3 or 4 graduate hours. Prerequisite: CEE 460.

CEE 463 Reinforced Concrete, II
Credit: 3 or 4 hours
Study of the strength, behavior, and design of indeterminate reinforced concrete structures, with primary emphasis on slab systems; emphasis on the strength of slabs and on the available methods of design of slabs spanning in two directions, with or without supporting beams. (3 undergraduate hours. 3 or 4 graduate hours). Prerequisite: CEE 461.

CEE 467 Masonry Structures
Credit: 3 or 4 hours.
Introduction to analysis, design and construction of masonry structures. Mechanical properties of clay and concrete masonry units, mortar, and grout. Compressive, tensile, flexural, and shear behavior of masonry structural components. Strength and behavior of unreinforced bearing walls. Detailed design of reinforced masonry beams, columns, structural walls with and without openings, and complete lateral-force resisting building systems 3 undergraduate hours. 3 or 4 graduate hours. Prerequisite: CEE 461.

CEE 468 Prestressed Concrete
Credit: 3 or 4 hours.
Study of strength, behavior, and design of prestressed reinforced concrete members and structures, with primary emphasis on pretensioned, precast construction; emphasis on the necessary coordination between design and construction techniques in prestressing. 3 undergraduate hours. 3 or 4 graduate hours. Prerequisite: CEE 461.

CEE 469 Wood Structures
Credit: 3 or 4 hours.
Mechanical properties of wood, stress grades and working stresses; effects of strength-reducing characteristics, moisture content, and duration of loading and causes of wood deterioration; glued-laminated timber and plywood; behavior and design of connections, beams, and beam-columns; design of buildings and bridges; other structural applications: trusses, rigid frames, arches, and pole-type buildings; and prismatic plates and hyperbolic paraboloids (3 undergraduate hours. 3 or 4 graduate hours). Prerequisite: CEE 460 or CEE 461.

CEE 470 Structural Analysis
Credit: 4 hours.
Direct stiffness method of structural analysis; fundamentals and algorithms; numerical analysis of plane trusses, grids and frames; virtual work and energy principles; introduction to the finite element method for plane stress and plane strain. Credit is not given for both CEE 470 and ME 471. Prerequisite: CEE 360.

CEE 471 Structural Mechanics
Credit: 3 or 4 hours.
Beams under lateral load and thrust; beams on elastic foundations; virtual work and energy principles; principles of solid mechanics, stress and strain in three dimensions; static stability theory; torsion; computational methods. 3 undergraduate hours. 3 or 4 graduate hours. Prerequisite: MATH 385 and TAM 251.

CEE 472 Structural Dynamics I
Credit: 3 or 4 hours.
Analysis of the dynamic response of structures and structural components to transient loads and foundation excitation; single-degree-of-freedom and multi-degree-of-freedom systems; response spectrum concepts; simple inelastic structural systems; introduction to systems with distributed mass and flexibility. 3 undergraduate hours. 3 or 4 graduate hours. Prerequisite: CEE 360, MATH 285, and TAM 212.

CEE 480 Foundation Engineering
Credit: 3 hours.
Analysis and design of foundations, bearing capacity and settlement of foundations; stability of excavations and slopes; ground movements due to construction; analysis and design of excavations, retaining walls, slopes, and underground structures in soil and rock. 3 undergraduate hours. No graduate credit. Prerequisite: CEE 380.

CEE 483 Soil Mechanics and Behavior
Credit: 4 hours.
Composition and structure of soil; water flow and hydraulic properties; stress in soil; compressibility behavior and properties of soils; consolidation and settlement analysis; shear strength of soils; compaction and unsaturated soils; experimental measurements. Prerequisite: CEE 380.
CEE 484 Applied Soil Mechanics  
Credit: 4 hours.  
Application of soil mechanics to earth pressures and retaining walls, stability of slopes, foundations for structures, excavations; construction considerations; instrumentation. Prerequisite: CEE 483.

CEE 490 Computer Methods  
Credit: 3 or 4 hours.  
Review of programming concepts; formulation and programming of numerical, data processing, and logical problems with applications from various branches of civil engineering; organization of programs and data; and development and use of problem-oriented programming languages in civil engineering. Same as CSE 491. 3 undergraduate hours. 3 or 4 graduate hours. Prerequisite: CS 101; senior or graduate standing in civil engineering.

CEE 491 Decision and Risk Analysis  
Credit: 3 or 4 hours.  
Development of modern statistical decision theory and risk analysis, and application of these concepts in civil engineering design and decision making; Bayesian statistical decision theory, decision tree, utility concepts, and multi-objective decision problems; modeling and analysis of uncertainties, practical risk evaluation, and formulation of risk-based design criteria, risk benefit trade-offs, and optimal decisions (3 undergraduate hours, 3 or 4 graduate hours). Prerequisite: CEE 202.

CEE 495 Professional Practice  
Credit: 0 hours.  
Series of lectures by outstanding authorities on the practice of civil engineering and its relations to economics, sociology, and other fields of human endeavor. 0 undergraduate hours. No graduate credit. Approved for S/U grading only.

CEE 497 Independent Study  
Credit: 1 to 16 hours.  
Individual investigations or studies of any phase of civil engineering selected by the student and approved by the department. 1 to 4 undergraduate hours. 1 to 16 graduate hours. Prerequisite: Consent of instructor.

CEE 498 Special Topics  
Credit: 1 to 4 hours.  
Structured presentations of new and developing areas of knowledge in civil engineering offered by the faculty to augment the formal courses available. Prerequisite: Individually identified for each offering under this course number; see Schedule. Some past special topics: Experimental Methods in Structures and Materials, Sustainable Housing, Sustainable Urban Engineering, Field Methods in Hydrologic and Environmental Engineering

CEE 501 Constr Mats Characterization  
Credit: 4 hours.  
Laboratory methods, such as mercury intrusion porosimetry, gas absorption, thermal analysis, scanning electron microscopy, and X-ray diffraction, used to characterize civil engineering materials. General topics covered for each method are theoretical background, calculation methods, models, and underlying assumptions, as well as operation of the instrument. Prerequisite: CEE 401.

CEE 502 Advanced Cement Chemistry  
Credit: 4 hours.  
Advanced topics in chemistry of portland cement, chemistry and microstructure of cements, chemical reactions that lead to hardening, chemistry and microstructure of hydrated cements, effects of chemical and mineral admixtures, and chemical issues involved in the engineering behavior of the cements. Prerequisite: CEE 401.

CEE 503 Constr Mats Deterioration  
Credit: 4 hours.  
Fundamental processes for deterioration mechanisms of infrastructure materials: corrosion of metals including thermodynamics, kinetics, passivity and rate measurements; degradation of cement-based materials including freezing and thawing, ASR, sulfate attack, fire attack and steel reinforcement corrosion; degradation of organic materials including photo-oxidation and ageing. A research literature review exercise related to material degradation. Prerequisite: One of CEE 400, CEE 401, CEE 405.
CEE 504 Infrastructure NDE Methods  
Credit: 4 hours. 
Fundamental bases and methodologies of non-destructive evaluation (NDE) techniques for infrastructure materials: methods for steel including ultrasound, radiography, eddy-current and magnetic-particles; methods for concrete including sounding, semi-destructive, ultrasound, seismic, impact-echo, impulse-response, ground-penetrating radar, infrared-thermography, and nuclear; planning and carrying out NDE structural investigations. Weekly laboratory sessions, a research paper, and an associated presentation related to NDE required. Prerequisite: One of CEE 400, CEE 401, CEE 405.

CEE 506 Pavement Design, II  
Credit: 4 hours. 
Development of models for and analysis of pavement systems; use of transfer functions relating pavement response to pavement performance; evaluation and application of current pavement design practices and procedures; analysis of the effects of maintenance activities on pavement performance; and economic evaluation of highway and airport pavements. Prerequisite: CEE 406.

CEE 508 Pavement Evaluation and Rehab  
Credit: 4 hours. 
Concepts and procedures for condition survey rating; evaluation by nondestructive testing (roughness, skid resistance, structural capacity); and destructive testing, maintenance strategies, and rehabilitation of pavement systems for highways and airfields. Prerequisite: CEE 406.

CEE 509 Transportation Soils  
Credit: 4 hours. 
Occurrence and properties of surficial soils, soil classification systems, soil variability; subgrade evaluation procedures, repeated loading behavior of soils; soil compaction and field control; soil moisture, soil temperature, and frost action; soil trafficability and subgrade stability for transportation facility engineering. Prerequisite: CEE 483.

CEE 512 Logistics Systems Analysis  
Credit: 4 hours. 
Planning, design and operations of complex logistics systems: logistics costs; production, transportation and distribution systems; lot-sizing; traveling salesman problem (TSP) and vehicle routing problem (VRP); transshippments; facility location problem; supply chain management and inventory control; order instability; analytical methods and practical solution techniques. Prerequisite: CEE 310 and IE 310.

CEE 515 Traffic Flow Theory  
Credit: 4 hours. 
Fundamentals of traffic flow, traffic flow characteristics, statistical distributions of traffic flow parameter, traffic stream models, car following models, continuum follow models, shock wave analysis, queuing analysis, traffic flow models for intersections, network flow models and control, traffic simulation. Prerequisite: CEE 416 and knowledge of probability and statistics.

CEE 516 Network Analysis of Systems  
Credit: 4 hours. 
Basic concepts, theories, and techniques of systems analysis, including modeling of large scale systems, forecasting, planning, control, and information handling; modeling of systems with network techniques, including distance, flow, and project networks; advanced network topics such as out-of-kilter algorithm and project resource analysis. Same as IE 512. Prerequisite: IE 361 or CEE 201.

CEE 517 Traffic Signal Systems  
Credit: 4 hours. 
Theory and application of concepts in traffic signal systems control, signal timing design, signal cabinet components, signal controllers, traffic signal theory and control, vehicle detection technologies, communication methods, interconnected rail-highway crossing signals, signal coordination, and signal systems network. Field trips to observe or utilize equipment in the Traffic Operations Lab (TOL) in ATREL or similar facilities. Prerequisite: CEE 416.

CEE 524 Construction Law
Credit: 4 hours.
Introduction to the legal aspects of the construction process and the potential liability that engineers can incur through the design, and post-construction processes. Organization and operation of the American court system, contact formation, defenses, remedies, and typical areas of dispute, and design services contracts, torts, product liability, agency, business organizations, intellectual property, and risk managements. Includes a mock trial of a recent construction-related case with the class serving as plaintiffs and defendants. Prerequisite: CEE 420, CEE 421, and CEE 422.

CEE 525 Construction Case Studies
Credit: 4 hours.
Case studies of bridges, tunnels, buildings, transportation systems, heavy industrial construction, waterways, and marine structures in the context of construction engineering and management. Research, a team-oriented term project, presentations, and discussions in studio-style format. Prerequisite: Two of CEE 420, CEE 421, and CEE 422.

CEE 527 Constr Conflict Resolution
Credit: 4 hours.
Basic theories and applications of dispute avoidance and resolution techniques in the construction industry. Mechanisms to promote collaborative environments and resolve disputes in construction projects; the different steps in the Dispute Resolution Ladder and the main features of a conflict management plan; case studies of practical applications of disputes avoidance and resolution techniques in the construction industry throughout the world. Prerequisite: One of CEE 420, CEE 421, CEE 422.

CEE 528 Construction Data Modeling
Credit: 4 hours.
Introduces state-of-the-art research and literature in the construction data modeling domain. Fundamental techniques of construction data modeling; existing construction data representation approaches and specifications for the architecture, engineering, and construction domain; building information models; capabilities and limitation of data process models and representation approaches and techniques. Prerequisite: Two of CEE 420, CEE 421, CEE 422.

CEE 534 Surface Water Quality Modeling
Credit: 4 hours.
Mathematical modeling of the movement and fate of pollutants and other substances in streams, lakes and other natural water bodies. Development of one, two, and three dimensional differential conservation equations, one, two and three dimensional steady-state and transient solutions. Finite difference, finite element, and finite particle methods. Lagrangian and Eulerian formulations, diffusion and dispersion tensors, numerical dispersion, and solution stability. Kinetic relationships describing important physical, chemical, and biochemical water constituent transformation phenomena. Field or laboratory experiment in model calibration and verification. Prerequisite: MATH 285, CEE 442, and CEE 451.

CEE 535 Environmental Systems, II
Credit: 4 hours
Fundamental concepts of uncertainty, risk, and reliability applied to environmental and water resources decision making. Chance constraints, Markov and Monte Carlo modeling, geostatistics, unconditional and conditional simulation, genetic algorithms, neural networks, simulated annealing, and a review of relevant portions of basic probability and statistical theory. Many techniques are applied to a real-world environmental decision making problem initially developed in CEE 434. Prerequisite: CEE 202 and CEE 434.

CEE 536 Multiattribute Decision Making
Credit: 4 hours.
Same as GE 530. See GE 530. Provides the student with background and practice in applying tools for subjective multiple attribute decision making when present or future states of nature are uncertain. Includes exploration of current research in developing computer aids to decision making. Discusses issues in descriptive versus normative approaches in the context of the interface between operations research and artificial intelligence. Covers multiattribute utility analysis from theoretical foundations through assessment procedures, practice, and pitfalls of potential cognitive bases. Same as CEE 536. Prerequisite: GE 331 or CEE 202.

CEE 537 Water Quality Control Proc I
Credit: 4 hours.
Theory and basic design of processes used in water and wastewater treatment, including adsorption, ion exchange, chemical oxidation and reduction, disinfection, sedimentation, filtration, coagulation, flocculation, and chemical precipitation. Prerequisite: Credit or concurrent registration in CEE 442 and CEE 443.

CEE 538 Water Quality Control Proc, II
Credit: 4 hours.
Theory and its application for design and operation of processes used in water and wastewater treatment; emphasis is on biological treatment processes and related processes for gas transfer, sludge dewatering, sludge disposal, and solids separations. Prerequisite: CEE 442 and CEE 443; credit or concurrent registration in CEE 444.

CEE 540 Remediation Design
Credit: 4 hours.
Evaluation and design of alternative treatment processes for hazardous waste sites contaminated with organic and/or metal wastes. Group design project due at the end of the term. Prerequisite: CEE 440.

CEE 543 Env Organic Chemistry
Credit: 4 hours.
Molecular-scale processes that control the fate of organic contaminants in natural environments and engineered treatment systems, including partitioning between environmental phases (water, air, organic, and biological phases), sorption onto solids (soils, sediments, aerosol particles), and transformation reactions (chemical photochemical, and biochemical). Emphasis on quantitative approaches for predicting contaminant fate using thermodynamic principles and molecular property descriptors. Prerequisite: CEE 443 or NRES 490.

CEE 545 Aerosol Sampling and Analysis
Credit: 4 hours.
Studies principles of sampling for particles and gases in the field of air pollution; examines instrumental techniques relevant to the design of sampling systems used in process control, ambient air monitoring, and laboratory experiments; methods of sample analysis and their limitations. Same as ATMS 535, ENVS 545, and ME 516. Prerequisite: MATH 385 and CEE 446.

CEE 546 Air Quality Control
Credit: 4 hours.
Application of principles describing the generation, separation, and removal of air contaminants from gas streams generated by stationary sources. Local field trips typically occur each term to see the application of the air quality control devices in the field. Same as ME 515. Prerequisite: CEE 442 or equivalent and CEE 446.

CEE 550 Hydroclimatology
Credit: 4 hours.
Application of deterministic and probabilistic concepts to simulate and analyze hydrologic systems; discussion of the theory and application of linear and nonlinear, lumped, and distributed systems techniques in modeling the various phases of the hydrologic cycle. Prerequisite: CEE 450.

CEE 551 Open-Channel Hydraulics
Credit: 4 hours.
Advanced hydraulics of free surface flow in rivers and open channels; discussion of theory, analytical and numerical solution techniques, and their applications to gradually and rapidly varied nonuniform flows, unsteady flow, and flow in open-channel networks. Prerequisite: CEE 451.

CEE 552 River Basin Management
Credit: 4 hours.
Introduction to the multidisciplinary knowledge (hydrology, economics, systems engineering, etc.) and methodological skills (optimization, simulation, etc.) for river basin management. River basin characterization-natural and social features; water availability assessment based on hydrology, infrastructure, and policy; environmental flow requirements; water demand management and microeconomics theory; integrated river basin management modeling. Prerequisite: CEE 350 and CEE 434.

CEE 555 Mixing in Environmental Flows
Credit: 4 hours
Physical processes involved in transport of pollutants by water; turbulent diffusion and longitudinal dispersion in rivers, pipes, lakes, and the ocean; diffusion in turbulent jets, buoyant jets, and plumes. Prerequisite: MATH 380, MATH 385, and TAM 335.

CEE 557 Ground water Modeling
Credit: 4 hours.
Examines theory and application of numerical methods, finite differences and finite element, for solving the equations of groundwater flow and solute transport; transport of chemically reacting solutes; model calibration and verification. Prerequisite: CEE 454; MATH 385.

CEE 559 Sediment Transport
Credit: 4 hours.
Physical processes of transportation and deposition of sediment particles in liquid bodies with particular emphasis on fluvial sediment problems; sediment in desilting basins; reservoirs and delta formation; erosion; stable channel design; and river morphology. Prerequisite: CEE 551.

CEE 560 Steel Structures, III
Credit: 4 hours.
Theories of ultimate behavior of metal structural members with emphasis on buckling and stability of members and frames; theory of torsion applied to beam torsion, lateral-torsional buckling, curved beams with emphasis on design criteria; post-buckling strength of plates and post-buckling versus column behavior. Prerequisite: CEE 462.

CEE 561 Reinforced Concrete III
Credit: 4 hours.
In-depth study of the behavior of reinforced concrete members, including the relationships between behavior and building code requirements. Prerequisite: CEE 463.

CEE 570 Finite Element Methods
Credit: 4 hours.
Theory and application of the finite element method; stiffness matrices for triangular, quadrilateral, and isoparametric elements; two- and three-dimensional elements; algorithms necessary for the assembly and solution; direct stress and plate bending problems for static, nonlinear buckling and dynamic load conditions; displacement, hybrid, and mixed models together with their origin in variational methods. Same as CSE 551. Prerequisite: CEE 471 or TAM 551.

CEE 572 Earthquake Engineering
Credit: 4 hours.
Source mechanisms, stress waves, and site response of earthquake shaking; effect on the built environment; nature of earthquake actions on structures; fundamental structural response characteristics of stiffness, strength, and ductility; representation of the earthquake input in static and dynamic structural analysis; modeling of steel and concrete structures under earthquake effects; outputs for safety assessment; comprehensive source-to-design actions project. Prerequisite: CEE 472.

CEE 573 Structural Dynamics II
Credit: 4 hours.
Advanced concepts in structural dynamics and fundamentals of experimental structural dynamics. Modern system theory; data acquisition and analysis; digital signal processing; experimental model analysis theory and implementation; random vibration concepts; system identification; structural health monitoring and damage detection; pseudo-dynamic testing and model-based simulation; smart structures technology (e.g., smart sensors; passive, active, and semi-active control). Prerequisite: CEE 472.

CEE 574 Probabilistic Loads and Design
Credit: 4 hours.
Application of probabilistic methods in describing and defining loads on structures with emphasis on the random fluctuation in time and space. Introduction to random vibration methods and applications to dynamic response of structures under wind and earthquake loads. Computer simulation of structural loads and responses. Probability-based safety criteria and review of current methods of selection of design loads and load combinations. Prerequisite: CEE 202 and CEE 472.
CEE 575 Fracture and Fatigue  
Credit: 4 hours.  
Fatigue and fracture behavior of steel structures and connections; fatigue and fracture mechanics theory and experimental data; assessment of behavior and current design specification practice. Prerequisite: CEE 462.

CEE 576 Nonlinear Finite Elements  
Credit: 4 hours.  
Nonlinear formulations in solid mechanics and nonlinear equation solving strategies; finite deformation (hyperelasticity) elastostatics and elastodynamics, semi-discrete weighted residual formulations, implicit and explicit time-stepping algorithms and stability analysis; theory of mixed finite element methods, strain-projection methods, and stabilized methods; mixed methods for nonlinear coupled-field problems. Prerequisite: CEE 471 or TAM 445; CEE 470 or ME 471.

CEE 577 Computational Inelasticity  
Credit: 4 hours.  
Theoretical foundations of inelasticity and advanced nonlinear material modeling techniques; constitutive models for inelastic response of metals, polymers, granular materials, biomaterials. Phenomenological models of viscoelasticity, viscoplasticity, elastoplasticity, porous plasticity and cyclic plasticity. Small-strain and finite-strain numerical implementation and code development. Same as CSE 553. Prerequisite: CEE 471 or TAM 551; CEE 570 or ME 471.

CEE 580 Excavation and Support Systems  
Credit: 4 hours.  
Classical and modern earth pressure theories and their experimental justification; pressures and bases for design of retaining walls, bracing of open cuts, anchored bulkheads, cofferdams, tunnels, and culverts. Prerequisite: Credit or concurrent registration in CEE 484.

CEE 581 Earth Dams  
Credit: 4 hours.  
Fundamentals of problems of slope stability; seepage in composite sections and anisotropic materials; methods of stability analysis; mechanism of failure of natural and artificial slopes; compaction; and field observations. Prerequisite: Credit or concurrent registration in CEE 484.

CEE 582 Consolidation of Clays  
Credit: 4 hours.  
(CEE 482) Elastic solutions relevant to soil mechanics; permeability; general application of Terzaghi's theory of one-dimensional consolidation; advances in consolidation theories; mechanism of volume change; delayed and secondary compressibility and creep; theory of three-dimensional consolidation and solutions; radial flow and design of sand drains; and analysis and control of settlement. Prerequisite: CEE 483.

CEE 583 Shear Strength of Soils  
Credit: 4 hours.  
(CEE 483) Physico-chemical properties of soils; fabric and structure of soil; mechanism of shearing resistance; residual shear strength of overconsolidated clays and clay shales; long-term shear strength of overconsolidated clays; Hvorslev shear strength parameters; and undrained shear strength of clays. Prerequisite: CEE 483.

CEE 585 Deep Foundations  
Credit: 4 hours.  
Ultimate capacities and load-deflection of piles and drilled shafts subjected to compressive loads, tensile loads, and lateral loads; effects of duration of load, soil-structure interaction; two- and three-dimensional analysis of pile groups with closely-spaced piles; effects of installation; inspection of deep foundations and full-scale field tests. Prerequisite: CEE 484.

CEE 586 Rock Mechanics and Behavior  
Credit: 4 hours.  
Physical properties and classification of intact rock, theories of rock failure, state of stress in the earth's crust, stresses and deformations around underground openings assuming elastic, plastic, and time-dependent behavior; effect of geologic discontinuities on rock strength; and introduction to stability analyses in rock. Prerequisite: CEE 483, GEOL 550, and TAM 451.
**CEE 587 Applied Rock Mechanics**
Credit: 4 hours.
Application of rock mechanics to engineering problems; shear strength of rock masses; dynamic and static stability of rock slopes; deformability of rock masses; design of pressure tunnel linings and dam foundations; controlled blasting and blasting vibrations; tunnel support; machine tunneling; design and construction of large underground openings; and field instrumentation. Prerequisite: CEE 586.

**CEE 588 Geotechnical Earthquake Engrg**
Credit: 4 hours.
Seismic hazard analysis, cyclic response of soils and rock; wave propagation through soil and local site effects; liquefaction and post liquefaction behavior, seismic soil-structure of foundations and underground structures, seismic design of retaining walls, underground structures and tunnels. Construction and machine vibrations. Blasting Prerequisite: CEE 472 and CEE 483.

**CEE 589 Computational Geomechanics**
Credit: 4 hours

**CEE 595 Seminar**
Credit: 0 to 1 hours.
Discussion of current topics in civil and environmental engineering and related fields by staff, students, and visiting lecturers. Approved for S/U grading only. May be repeated.

**CEE 597 Independent Study**
Credit: 1 to 16 hours.
Individual investigations or studies of any phase of civil engineering selected by the student and approved by the adviser and the staff member who will supervise the investigation. Prerequisite: Consent of instructor.

**CEE 598 Special Topics**
Credit: 1 to 4 hours.

**CEE 599 Thesis Research**
Credit: 0 to 16 hours.
Approved for S/U grading only. May be repeated. Instructor approval required.

For the current list of CEE 498 & 598 Special Topics courses visit the Illinois on-line timetable at:
[http://courses.uiuc.edu/cis/index.html](http://courses.uiuc.edu/cis/index.html)
APPENDIX 1 – PROCEDURES FOR GRIEVANCES

1. Introduction: This policy describes the procedures to be employed to resolve grievances by graduate students in the Department of Civil and Environmental Engineering. This policy applies to all graduate students and members of the academic community in the Department of Civil and Environmental Engineering. The purpose of this policy is to protect the interests of graduate students in the Department of Civil and Environmental Engineering (CEE) by providing informal and formal means of seeking resolution in case of a potentially inappropriate action of a member of the faculty or administrative staff or an inappropriate application of a departmental policy. Any current or former graduate student in the Department of Civil and Environmental Engineering may informally pursue or formally file a grievance when he/she believes that a decision or behavior adversely affects his/her status as a graduate student, as long as the student meets the timeliness requirements specified in this policy. This policy does not apply in cases of research misconduct. Breaches of academic integrity in research and publication are handled under the campus’s Policy and Procedures on Academic Integrity in Research and Publication. Similarly, this policy does not apply to cases that arise under the Code of Policies and Regulations Applying to All Students (“Code”), such as capricious grading in a course (Section 26) or academic integrity (Section 33). The policies and procedures described in this document do not override or supersede any other policies as established in the University Statutes and campus policies.

2. Definition of a Grievance: A grievance may arise when a graduate student believes that his/her status as a graduate student has been adversely affected by an incorrect or inappropriate decision or behavior. Examples include, but are not limited to the following:

- inappropriate application of a department or University policy;
- being unfairly assessed on a preliminary examination;
- being improperly terminated from a program;
- being required to perform personal services unrelated to academic duties;
- being required to meet unreasonable requirements for a graduate degree that extend the normal requirements established by the campus or by the department and are inconsistent with the scholarly standards in the discipline;
- being the subject of retaliation for exercising his/her rights under this policy; or
- being the subject of professional misconduct by a student’s graduate supervisor or other faculty or staff member.

3. Informal Procedures: University policy strongly encourages all students who believe they have a grievance to use all appropriate avenues for informal resolution before initiating a formal grievance. Students in CEE are encouraged to discuss the issue with the faculty or staff member with whom the problem has arisen. If a satisfactory solution is not forthcoming, the student should discuss the issue with his or her advisor, the director of graduate studies, or the head of the department, who shall attempt to find a resolution acceptable to both parties. This process must be initiated within 60 business days of the decision or behavior resulting in the grievance. The student may also consult with the Graduate College, the Office of the Dean of Students, the International Student and Scholar Services Office, or other sources before pursuing a formal Departmental grievance.

4. Formal Procedures: In CEE, the grievance committee will be formed from members of the Graduate Affairs Committee. The Graduate Affairs Committee consists of one appointed faculty representative from each of the seven areas of the department and two graduate students. The chair of the Graduate Affairs Committee will form an appropriate subcommittee of members of the Graduate Affairs Committee to serve as the grievance committee. This subcommittee will consist of at least two faculty members and in most cases, two graduate students. (The grievant may ask that no graduate students be included in the grievance committee; in that case a third faculty member will be added.) The identities of the grievance committee will be made known to all parties involved. A student in the Department of Civil and Environmental Engineering may file a formal grievance with either the department head or directly with the Graduate College, as the student elects. If an informal departmental procedure was followed and the
resolution was unsuccessful, then a formal grievance must be filed within 10 business days after the decision was made and both the grievant and the subject were informed that there was no resolution at the informal stage. If the grievant did not pursue an informal procedure, a formal grievance must be filed within 60 business days of the decision or behavior resulting in the grievance. To initiate the Formal Procedures, the written grievance should indicate the parties involved, the date(s) of the alleged incident(s), the action or decision being contested, any applicable university, campus or unit policy, an explanation of why the action or decision is inappropriate, and the remedy sought. The head shall define the subject matter and scope of the issues related to the grievance in a written charge to the grievance committee. The primary parties involved, the grievant, the subject(s) and the grievance committee, shall receive a copy of the charge. Any participant to the grievance may challenge any member of the grievance committee if there is a perceived conflict of interest. The challenge must be made in writing to the head of the department within five business days of receipt of the charge. If the objection is reasonable, the head shall replace the person with one who meets the stated criteria. The grievance committee’s investigation shall include a review of written materials presented by both the grievant and subject and may seek information from the primary involved parties in writing or in person. The grievance committee determines if a hearing is to be held. During a hearing, each of the primary involved parties may make a brief opening statement, and then respond to questions from the committee. The primary involved parties may not question each other directly, but may pose questions through the committee chair. At the end of the hearing, each primary involved party may make a closing statement. As soon as practical after the filing of the grievance, the chair of the grievance committee shall report its recommendations in writing to the department head/chair/director. The grievance committee’s report shall contain:

- A copy of the Written Charge from the department head
- A summary of the grievant’s contentions and relief sought
- The response of the individual or department against whom/which the grievance was filed
- A general description of the investigative process
- A citation of relevant policies
- An explicit finding of fact based on the preponderance of the evidence with respect to each grievance included in the grievance committee’s charge
- A listing of the evidence relevant to each finding
- An indication of whether there was a reasonable basis in fact and honest belief for the allegations in the investigated grievance
- A recommendation of appropriate redress for the grievant(s) and
- Any recommended changes in policies and procedures to minimize the probability of recurrence.

Copies of the committee report shall be provided to both the grievant and the subject(s). Either party may submit written comments to the department head concerning the report within five business days of receipt of the report.

As soon as practical following the receipt of the committee report and all written comments concerning the report, the head shall determine the disposition of the case and communicate the decision to the primary involved individuals. If the head determines that the grievance has not been proved nor has any merit, the head will notify all involved parties and all persons who have been interviewed or otherwise informed that the grievance has been dismissed. If the head concurs with the committee’s conclusion that the grievance has been sustained and has merit, the head will proceed in accordance with the University statutes and relevant University rules and regulations. The head may, after consultation with appropriate campus officers, prescribe redress for the grievant. In addition, the head may initiate modifications of department policies or procedures. The head shall notify the relevant primary involved individuals in writing (grievant, respondent, grievance committee members) of actions taken.

5. Appeal: Within 10 business days of receipt of written notification of the head’s determination, appeals may be made to the Graduate College as specified in the Graduate College grievance policy. This appeal
can be based only upon demonstrated specific deficiencies in the application of this department grievance procedure to the student’s grievance.

After completion of a grievance review and all ensuing related actions, the head shall return all original documents and materials to the persons who furnished them. A report of the nature of the grievance and the primary involved parties shall be forwarded to the Graduate College.

6. General Provisions: The head shall have the primary responsibility for administering the procedures detailed herein. All information and items furnished will be made available to the grievance committee. During the course of an investigation, the head will provide information about the status of the proceedings to the primary involved individuals. Subsequent to the grievance committee’s reporting, the head will maintain a file of all documents and evidence, and is responsible for the confidentiality and the security of the file. The grievance file is subject to destruction on a date six years beyond the grievant’s time limit for completion of the degree. The head shall make the complete file available to the intake dean of the Graduate College on the appeal of a grievance outcome to the Graduate College.

7. Withdrawal of a Grievance: The grievant may submit a written request to withdraw the grievance at any time. The head shall decide whether to approve the request. If the withdrawal request is approved, the head shall notify the primary parties involved and the files shall be destroyed. If the withdrawal request is denied, the grievance shall continue to be processed to a conclusion according to the above procedures.

8. Other Requirements, Definitions, Standards, and Considerations: The departmental parties responsible for the implementation of this policy may consult University Legal Counsel at any time during the informal or formal processing of a grievance. All persons involved in administering these procedures will make diligent efforts to protect the reputations, privacy, and positions of all involved persons. These persons include those who file grievances, persons who are alleged in a grievance to have taken inappropriate actions or activities, and department administrators. All of the procedures and the identity of those involved should be kept confidential to the extent permitted by law. However, confidentiality regarding information other than the identity of the grievant need not be maintained if the grievance is found to be false and in particular if dissemination is necessary to protect the reputation of individuals or units falsely accused. Making public the fact that a grievance has been deemed false or unproved is not considered retaliation against the grievant. Protection of confidentiality does not preclude disclosures necessary to redress actions leading to a grievance.

The grievance committee’s decision shall be made on the “preponderance of evidence” standard. Any finding against an individual or department on the subject of the grievance must be supported by a preponderance of the evidence. It shall be a prime concern of all persons who implement this policy and these procedures to protect the academic freedoms fundamental to the academic enterprise. Among other things, this includes the professional judgments of student performance that are an essential part of the graduate education process. Academic freedom, however, affords no license for the mistreatment of graduate students. The rights of the primary involved individuals shall be specified in the form of a written notice or letter from the head. The primary involved individuals have the following rights:

- To receive notice of the identity of the members of the grievance committee.
- To receive a written statement of the charge including the subject matter being considered by the grievance committee. If additional information emerges during the committee’s evaluation that substantially changes the subject matter, the parties shall be informed promptly in writing.
- To submit statements in writing and to request to meet with the committee to present information and to request a hearing.
- To use a consultant, or another person, who may provide advice during the process. If a hearing is held, prior notice of the presence of a consultant must be given. If any party’s consultant at any meeting is an attorney, all participants must be informed at least three business days prior to such
a meeting. Any other primary involved party may request a delay of up to 5 business days to arrange for the presence of a consultant.

- To review and respond to the grievance committee’s final report.

A **conflict of interest** is a significant professional or personal involvement with the facts or the parties to a dispute. Any participant who has a conflict of interest in a dispute under this procedure, or a concern about a conflict on the part of another, shall report it to the head who shall take appropriate action. If the head has such a conflict, the head will inform the intake dean of the Graduate College who will, in consultation with the dean of the Graduate College, decide how to address the situation.

All procedures prescribed in this document should be conducted expeditiously. The head, for good cause, may extend any of the time periods and may make other reasonable alterations of these procedures, provided that the alteration does not impair the ability of a grievant to pursue a grievance or the respondent(s) named in the grievance to defend him/herself. Any alterations of these procedures must be communicated to all pertinent parties.

Withdrawal from the University by the grievant or the **termination** of University employment of any of the subjects in a grievance, by resignation or otherwise, after initiation of procedures under this policy shall not necessarily terminate these proceedings. Bringing unfounded charges in bad faith is a violation of this and the Graduate College grievance policy. If the grievance committee determines that the allegation(s) in the grievance or the testimony of any person was unfounded and motivated by bad faith, that finding shall be communicated by the head to the dean of the Graduate College. Such finding may be the basis for disciplinary action or other personnel decision in accordance with University rules and regulations.

Reviewed by Graduate College 08/09/2011
APPENDIX 2 – MS DEGREE REQUIREMENTS AND PROCEDURES FOR THE EIGHT DEPARTMENTAL AREAS

MSCE DEGREE REQUIREMENTS FOR CONSTRUCTION MATERIALS, GEOTECHNICAL, TRANSPORTATION, ENVIRONMENTAL ENGINEERING:  Check with your advisor.

MSCE DEGREE REQUIREMENTS FOR STRUCTURES
Please refer to the structural engineering web site for the most current requirements and procedures: http://structures.cee.illinois.edu/masters.

MSEE AND MSES DEGREE PROGRAMS IN ENVIRONMENTAL ENGINEERING AND SCIENCE
Please refer to the environmental engineering and science web site for the most current requirements and procedures: http://environmental.cee.illinois.edu/.

MSCE DEGREE REQUIREMENTS FOR ENVIRONMENTAL HYDROLOGY AND HYDRAULIC ENGINEERING
Please refer to the environmental hydrology and hydraulic engineering web site for the most current requirements and procedures: http://hydro.cee.illinois.edu/.

MSCE DEGREE REQUIREMENTS FOR CONSTRUCTION ENGINEERING AND MANAGEMENT
Students are required to complete 36 hours of graduate course work without a thesis, or 32 hours of course work with a thesis. At least 12 hours must be taken in the fields of construction engineering and management areas at the 400-level. At least three 500-level courses must be taken, at least 8 hours must be in the fields of construction engineering and management. The rest of the hours (electives) can be taken from related fields of construction engineering and management, including business administration, finance, architecture, and industrial engineering. Students are expected to work closely with their program advisors to develop programs of study that will meet the degree requirements and the student’s career objectives. All programs of study are subject to review and approval by the construction area advisors.
APPENDIX 3 – PHD ANNUAL REVIEW FORM

DATE: _______________   NAME: _________________________   ADVISOR: __________________

Annual Ph.D. Candidate-Advisor Conference v.4

Student should fill out form first and then consult with advisor to obtain his/her opinion. Completed form should be returned to Mary Pearson in 1108 NCEL before APRIL 1

A. To be completed by the Ph.D. Candidate:

<table>
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<tr>
<th>Dates:</th>
<th>Estimated</th>
<th>Actual</th>
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<tr>
<td>Date of Admission to Ph.D. Curriculum:</td>
<td>xxxxxxxxxxxxxxxxxxxxxx</td>
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<tr>
<td>Submitted Application for Admission to Candidacy Form (yellow form)</td>
<td>within 2 semesters after admission</td>
<td>within 2 yrs after admission</td>
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<tr>
<td>Qualification Procedure:</td>
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<td>Preliminary Exam Date:</td>
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<td>Graduation:</td>
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On-line Responsible Conduct of Research Date completed: \\

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<thead>
<tr>
<th>Question</th>
<th>Doctoral Candidate’s Opinion</th>
<th>Advisor’s Opinion</th>
</tr>
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<tbody>
<tr>
<td>1. Presentations at national meetings and refereed journal publications to date:</td>
<td>None to date See appended list</td>
<td>\</td>
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<tr>
<td>3. Principal goal(s) of the study:</td>
<td>I agree! See my comments.</td>
<td></td>
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<td>4. Progress to date has been...</td>
<td>I agree! See my comments.</td>
<td></td>
</tr>
<tr>
<td>5. Major Accomplishments during past year.</td>
<td>I agree! See my comments.</td>
<td></td>
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</tbody>
</table>
6. The resources required for the study are… | available | lacking (explain) | I agree! See my comments.
--- | --- | --- | ---
7. Remaining challenges or difficulties… | | | I agree! See my comments.
8. Significant teaching experience… | Explain any major TA duties or significant teaching experience | | I agree! See my comments.

B. Advisor’s general assessment of Ph.D. Candidate’s performance to date: (please rank performance on scale below by checking appropriate box.)

| ???? | NORMAL | SUPER |
--- | --- | ---

C. Advisor’s Comments: (As appropriate, please comment upon items above)

D. New future procedures or redirections of effort agreed to:

Advisor Last name (printed): ___________________ Advisor Signature: ___________________
Student Name Printed: ___________________ UIN: ___________________
Student Signature: ___________________ Date: ___________________
APPLIED FOR ADMISSION TO THE PH.D. IN
CIVIL AND ENVIRONMENTAL ENGINEERING

TO BE COMPLETED BY THE APPLICANT:

NAME: ____________________________________________________________
       First                        Middle                        Last

AREA OF CIVIL AND ENVIRONMENTAL ENGINEERING:
_________________________________________________________________

I wish to apply for admission to candidacy for the Ph.D. in Civil and Environmental Engineering. If I am admitted to candidacy, I wish for my research advisor to be

___________________________________

_______________________________________________ ___________________
Signature of Candidate     Date

TO BE COMPLETED BY THE ADVISOR:

If the applicant is admitted to Ph.D. candidacy, I am willing to serve as his/her research advisor.

_______________________________________________ ___________________
Signature of Advisor      Date

NOTE: SIGNING OF THIS FORM DOES NOT IMPLY AN AGREEMENT ON THE PART OF THE FACULTY MEMBER TO PROVIDE FINANCIAL SUPPORT, BUT IT DOES IMPLY AN OBLIGATION TO PROVIDE SERVICE AS THE RESEARCH ADVISOR UNTIL THE PH.D. DEGREE IS COMPLETED, STUDY IS TERMINATED, OR ANOTHER ADVISOR AGREES (BY SIGNING THIS SAME FORM) TO ASSUME THE ADVISING DUTIES.

The Faculty Review Committee is to be listed on the reverse side of this page.

The faculty should circle Yes or No and sign and date by their name to indicate their approval of the above named candidate’s admission into the Ph.D. program.

Thank you.