The purpose of this handbook is to introduce you to the Department of Civil, Environmental, and Geo-Engineering and make your experience as an undergraduate student in the department a productive one. This document contains answers to many questions that you may have, but please use this resource as a guide only. If you have specific questions pertaining your degree plan or your academic career please contact your faculty adviser, Director of Undergraduate Studies for your degree program (listed below), or the Department of Civil, Environmental, and Geo-Engineering at 612-625-5522. Another helpful resource is the department’s website at www.cege.umn.edu.

The undergraduate degree programs in civil engineering, environmental engineering, and geoengineering will prepare you to enter directly into the profession or prepare you to continue your education as a graduate student. In addition to your classroom studies, you will have the opportunity to participate in extra-curricular activities of both a social and professional nature, to gain valuable research and internship work experience, and to expand your horizons by studying abroad.

You are encouraged to take advantage of the many opportunities available and to further explore the undergraduate and graduate programs here at the University of Minnesota.

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CSE Distinguished Professor
Director of Undergraduate Studies (DUGS)
Civil Engineering Program

Timothy LaPara
Professor
Director of Undergraduate Studies (DUGS)
Environmental Engineering Program

Randal Barnes
Associate Professor
Director of Undergraduate Studies (DUGS)
Geoengineering Program

Joseph Labuz
MSES/Kersten Professor
Department Head
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2019-2020 Academic Calendar

Fall Semester 2019

September
2  University closed for Labor Day holiday
3  Fall semester classes begin
17  Last day for undergraduates to apply for fall graduation

November
12  Spring 2019 registration begins for admitted degree-seeking students
28  University closed (Thanksgiving)
29  University closed

December
11  Last day of classes for fall semester
12  CEGE Fall Departmental Graduation Ceremony and Reception
13-19  Final examinations
23-25  University closed

Spring Semester 2020

January
1 & 20  University closed
21  Spring semester classes begin

February
3  Last day to apply for spring undergraduate graduation

March
9-13  Spring break

May
4  Last day of classes for spring semester
7-13  Final examinations
8  CEGE Departmental Graduation Ceremony and Reception
8  CSE Spring Graduation 7:00 p.m. Mariucci
25  University closed

May Session 2020/Summer Term 2020

May
18  May session and summer 13-week classes begin

June
5  Last day of May session
8  First day of summer term

July
4  University closed

For more detailed calendar, please see http://onestop.umn.edu/calendars/.
Important Deadlines

- Required CEGE Welcome/Orientation for new students
- Meeting with CEGE faculty adviser: After getting admitted into upper division and prior to registration each semester as a minimum
- Plan to take the Fundamentals of Engineering (FE) exam in the Fall or Spring of your Senior year. This is a required first step for professional licensure, and many employers look to hire Engineers in Training (EITs) who have successfully passed the examination
- Application for graduation\(^1\): When you have completed 75% of the credits applicable toward your degree, you will be automatically scheduled to graduate. If you wish to apply early, the how-to guide at online degree application will provide you step-by-step instructions. This link will also instruct you on how to modify your graduation term or name as it will appear on your diploma.

**Application Deadlines**

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<tbody>
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<td>S20</td>
<td>October 2019</td>
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<tr>
<td></td>
<td>Summ20/F20</td>
<td>February 2020</td>
</tr>
<tr>
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<td>February 18, 2020</td>
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<tr>
<td>Admission to Major</td>
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<td>March 1 – May 25</td>
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<td></td>
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<td>October 1 – December 30</td>
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<td>Automatically assigned</td>
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<tr>
<td>CSE Graduation Ceremony</td>
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<td>Thursday December 12, 4:00 p.m.</td>
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<td>S20</td>
<td>Friday May 8, 4:00 p.m.</td>
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<td>Co-op Reports</td>
<td>Summer/Fall</td>
<td>January 15</td>
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<tr>
<td></td>
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<td>September 15</td>
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<tr>
<td>IOP – Research</td>
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<tr>
<td></td>
<td>Spring 2020</td>
<td>First week of the semester</td>
</tr>
</tbody>
</table>

\(^1\)Upon admission to the major, CSE designates a students’ intended graduation semester. You can update this date by e-mailing the college at csestudent@umn.edu.
Department Directory

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122 Civil Engineering Building
500 Pillsbury Drive S.E. Minneapolis, MN 55455
Tel.: 612-625-5522
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Department Administration

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<td>Stolarski, Henryk</td>
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<td>Voller, Vaughan</td>
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</table>

# Teaching Specialists

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<th>Title</th>
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Mission Statement and Program Educational Objectives

Civil, Environmental and Geo-Engineering

Mission Statement
We learn concepts and methods, discover solutions and processes, and transform the world by addressing critical challenges in designing and protecting our infrastructure, environment, water and earth resources.

Learn – We offer rigorous undergraduate degree programs that prepare students for a professional career or advanced study. Our graduate programs challenge the frontier of knowledge.

Discover – We develop and design solutions using analytical, numerical, and physical models. Our original ideas, diverse perspectives, and international collaborations take advantage of the Minneapolis-St. Paul urban laboratory and the Minnesota landscape.

Transform – We connect with and serve as a resource for the local community, profession, and society. We include, listen to, and support people with different backgrounds and perspectives.

Program Educational Objectives
The program educational objectives are such that the graduates of the civil engineering, environmental engineering, and geoengineering programs will

1. practice technical proficiency and adaptability, and participate in life-long learning to meet the challenges facing the professions in industries, government agencies, academia, or other careers;
2. exhibit strong communication, interpersonal, and management skills as leaders and team members in their profession;
3. exercise their role as ethical professionals that protect and sustain human health, welfare, and the environment.

The Department of Civil, Environmental, and Geo-Engineering offers three degree programs:

- Bachelor of Civil Engineering (BCE)
- Bachelor of Environmental Engineering (BEnvE)
- Bachelor of Geoengineering (BGeoE)

The BCE, BEnvE, and BGeoE degrees are accredited by the Engineering Accreditation Commission of ABET, http://www.abet.org. The degree programs are described in Sections II, III, and IV.
I. General Information, Policies, and Procedures

The general policies regarding issues such as registration, grading, and attendance can be found on the University of Minnesota OneStop website including the deadlines and procedures. For your convenience, links to particular topics are provided in the sections below. The link to the College of Science and Engineering Policies, Procedures and Forms website is https://cse.umn.edu/r/policies-procedures-and-forms/.

1. Advising

Lower Division Advising

All lower division students in the college are assigned a college adviser (i.e., CSE Adviser) to serve as their academic adviser throughout their time as an undergraduate. The adviser is assigned based on cluster areas, meaning that each adviser has several majors that he/she “specialize” in, although all are trained to help with any major. Students are required to have contact with their CSE adviser or the advising office every semester until they are admitted to their major. The first semester students meet one-on-one with their CSE academic adviser. Second semester freshmen also meet one-on-one. Fall semester of the sophomore year, students attend a CSE college meeting where they learn more about opportunities and recommendations from advising/academics, the career center, and collegiate life. The majority of students are admitted to their major following fall semester of their sophomore year. The link to the college advising resources is https://cse.umn.edu/r/academic-advising. Four year plans are available for planning purposes at https://cse.umn.edu/r/four-year-plans/.

Upper Division Advising

New upper division students in the Department of Civil, Environmental, and Geo-Engineering (CEGE) are required to attend a welcome/orientation session upon admittance. Notification of the orientation sessions are sent through e-mail. A student will not be allowed to register without attending the orientation. After the required orientation upon admittance to the program, students are advised by Faculty Advisers as follows:

Civil engineering (CE) students submit a request for their choice of Faculty Adviser by completing the Adviser Request Form. Information on advisers can be found by reviewing the Civil Engineering Advisers page. The CE students are notified within two to three weeks after they make their selection. Assignments are made on a first come – first serve basis to the available capacity of each adviser. Every effort is made to pair students with their first choice preference. In general, a student’s Faculty Adviser will not change unless the faculty adviser is not available due to a medical or sabbatical leave, in which case, the student will be notified to choose another adviser. Students may also request an adviser change using the Adviser Request Form.

Environmental engineering (EnvE) students submit a request for their choice of environmental faculty adviser by completing the Adviser Request Form. Information on advisers can be found by reviewing the Environmental Engineering Advisers page. The EnvE students are notified two to three weeks after they make their selection. Assignments are made on a first come – first serve basis to the available capacity of the adviser. Every effort is made to pair students with their first choice preference. In general, a student’s Faculty Adviser will not change unless the faculty adviser is not available due to a medical or sabbatical leave, in which case, the student will be notified to choose another adviser. Students may also request an adviser change using the Adviser Request Form.
Adviser Request Form.

**Geoengineering (GeoE) students** are all advised by the Director of Undergraduate Studies for Geoengineering, Prof. Randal Barnes. Prof. Barnes also advises all honor students.

Students who are on probation must meet with the respective Director of Undergraduate Studies for their degree program, as well as their CSE academic adviser.

CEGE requires all upper division civil engineering, environmental engineering, and geoengineering students to meet with their faculty adviser at least once per semester. An advising hold is placed on your records prior to registration, preventing you from registering for classes until you meet with your faculty adviser. It is the responsibility of the student to contact their faculty adviser and request an appointment at least two weeks prior to the meeting.

Students should prepare for their advising appointment by reviewing their APAS (Academic Progress Audit System) report, used for checking progress towards graduation, sample 4-year program plans (Sections II.9&10, III.9, IV.9, which should be only viewed as a guide), and potential technical electives. Some areas of emphasis have longer prerequisite hierarchies associated with technical elective choices, so it is beneficial for students to consult their faculty adviser regarding the most expeditious plan. It is important to note that many required courses are offered every semester, whereas, technical elective classes are offered less frequently. Students should discuss with their faculty adviser appropriate technical electives and how to best fit them into their plan. Faculty advisers can approve courses as technical electives that are outside of the preapproved list of technical electives in Appendix A. If you need changes made to your APAS, there is a form available for you to fill out with your faculty adviser and submit to CSE. The form can be found via a link on the following web page https://cse.umn.edu/r/policies-procedures-and-forms/.

Students should come prepared to their advising meetings to discuss opportunities such as scholarships, research assistantships, internships, study abroad, career options, graduate studies, etc. Your advising appointments help you to build a relationship with your faculty adviser, who is an important contact for providing letters of recommendation for scholarships, employment, and graduate school applications. Students should also discuss opportunities with their course instructors and other faculty in their preferred area of emphasis.

Students can also contact the directors of undergraduate studies (DUGS) for the three degree programs offered in the department:

- DUGS Civil Engineering: Professor Catherine French <cfrench@umn.edu>
- DUGS Environmental Engineering: Dr. Timothy LaPara <lapar001@umn.edu>
- DUGS Geoengineering: Professor Randal Barnes <barne003@umn.edu>
2. **Application to Upper Division**

Upper division (within the major) corresponds to students who have been admitted into the civil engineering, environmental engineering, or geoengineering programs. Students must complete particular courses prior to admission into the upper division programs. Sections II.2, III.2, IV.2 list the requirements for admission to the civil engineering, environmental engineering, and geoengineering programs, respectively. Freshmen are admitted to pre-major status before formal admission to the major. Many transfer students are directly admitted to the degree programs. It is recommended that students take CEGE 1101 - Introduction to Civil, Environmental, and Geo-Engineering Seminar, which serves as a technical elective and introduces students to the various areas of emphasis and degree programs within CEGE (this course is not required). For more information about University of Minnesota admission requirements visit [z.umn.edu/csemajorapp](http://z.umn.edu/csemajorapp) and the [Office of Admissions](http://www.umn.edu) web site.

3. **Registering for Courses**

Prior to registering for your courses you should meet with your adviser. In lower division, you are required to meet with your CSE adviser. In upper division, you are required to meet with your faculty adviser. An advising hold will be placed on your record until you meet with your adviser. The following is a list of important links related to registration. Please note that some courses require prerequisites including minimum grades achieved in those courses (i.e., C- or better). This information can be found in the University Course Catalog and on line when registering. You are responsible for ensuring that you meet the prerequisites.

**Gaining Admission to a Closed Course and Permission numbers**

To register for a class that is closed or requires permission, directly contact the course instructor. Permission numbers are not automatically granted. After the second week of class, permission numbers will no longer be available. You will have to fill out the [Academic Petition Policy](http://www.umn.edu), ask instructor to sign form, and submit it to CSE Advising Office (105 Lind Hall).

**Changing Registration**

*Cancel/Add of courses*

*Change of grade options* – Courses used to satisfy major course work cannot be taken S/N unless that is the only option for the course. D grades are not permitted to satisfy requirements in major courses.

*Fees associated with late registration*

*Actions which affect transcript (e.g., course withdrawal)*

**Mandatory Class Attendance**

4. **Grades**

Per [University guidelines](http://www.umn.edu), students must obtain a grade of at least “C-” in all courses required for degrees in civil engineering (CivE), environmental engineering (EnvE), and geoengineering (GeoE). Students who receive a “D” or lower in a course required for the degree must re-take the course. Per [University guidelines](http://www.umn.edu), students may re-take a course only once.
5. Academic Probation
Students are required to maintain certain semester and overall GPAs. If these requirements are not met, the student is placed on academic probation which may delay registration and may result in suspension. Students in this situation must make an appointment with the Director of Undergraduate Studies for their degree program and their CSE Adviser to go over the academic probation contract. Students should also visit the CSE academic probation and suspension webpage for steps to complete while on academic probation.

6. Academic Honesty
Academic honesty is of utmost importance. Students are responsible for their own work, even in group settings. It is as important for you not to share your work with someone as it is for someone not to use your work. What is considered “sharing” work is different in some classes than others and is based on the instructor’s guidelines. It is your responsibility to check those guidelines to ensure that you are in compliance with the course policy. Actions that result from academic dishonesty can involve getting a zero for the work, failing a course, and suspension from the university. Faculty who observe noncompliance or are informed of noncompliance are required to report the students to the Office for Community Standards.

7. Degree Progress and Graduation Planning Tools
There are two primary tools available to you to navigate your way towards graduation: the Academic Progress Audit System (APAS) Reports and the Graduation Planner (see links below).

The APAS report is the primary tool that the university uses to check your compliance with the graduation requirements. The APAS system is automatic, and in some cases, may not accurately reflect that you have met some of your requirements (e.g., technical elective requirements). You are encouraged to check your APAS at least once each semester to assess your progress and identify any adjustments that may need to be made. It is your responsibility to check that you have met all of the appropriate degree requirements, which may entail meeting with your faculty adviser to make some modifications to your APAS to accurately reflect that your requirements have been met. This should be done well before graduation. To fix your APAS report you will need to fill out the APAS correction form. Both you and your adviser need to sign it. It then gets turned in to the CSE Academic Advising office in 105 Lind Hall.

The graduation planner is a tool that you can use to create a course plan that fits your individual scheduling preferences in achieving the degree requirements (See sample plans in the CivE II.9&10, EnvE III.9, and GeoE IV.9 sections of this handbook).

Academic Progress Audit System (APAS) Reports

Graduation Planner

APAS Correction Form
8. Graduation and Application for Degree
A graduation checklist is available online to get you prepared to graduate. When you have completed 75% of the credits applicable toward your degree, you will be automatically scheduled to graduate. If you wish to apply early, the how-to guide at online degree application will provide you step-by-step instructions. This link will also instruct you on how to modify your graduation term or name as it will appear on your diploma. See section on Important Deadlines.

For questions about the College of Science and Engineering graduation ceremony, students can contact CSE Student Services at 612-624-2890, with any questions or concerns about graduation or the CSE graduation webpage. The CSE graduation is only scheduled during spring semester.

The Department of Civil, Environmental, and Geo-Engineering holds a departmental ceremony just for civil engineering, environmental engineering, and geoenineering students at the end of fall and spring semesters, where students are inducted into the Order of the Engineer. Graduating students will get an email towards the end of their final semester with details of the ceremony and information on how to participate. Family and friends are encouraged to attend the event. It gives the faculty the opportunity to congratulate you and see you off. Students can contact the CEGE front office, CivE 122, with any questions about the departmental graduation or Tiffany Raston in CivE 143.

9. Transcripts
Transcripts (official and unofficial) may be obtained at One Stop.

10. Collegiate Fees
The CSE computer fees are charged to students in the College of Science and Engineering and some students in other colleges. The fees are assessed at enrollment. Other fees that the College of Science and Engineering assess at enrollment can be found here.

11. CEGE Course Fees
There are course fees charged to students in certain CEGE courses that contain labs or field trips to pay for supplies or transportation for that class. The course fee varies depending on what is needed for that class. The course fees will be assessed at enrollment to your student account.

12. Honors
The University Honors Program (UHP) serves all undergraduate honors students at the University of Minnesota -Twin Cities, aiding them in their creation of an enriched, interdisciplinary educational experience. Honors experiences are achieved through a combination of coursework and other experiences. Further information can be found in Section VI Honors Program and at CSE Honors Advising. CEGE students wishing to graduate with Latin Honors Degrees (e.g., suma cum laude), should contact Prof. Randal Barnes, CEGE Honors Adviser. See Section VI of this handbook.

13. Research Opportunities
One of the advantages of attending a large research university is the multitude of opportunities for undergraduate students to become involved in cutting edge research. Students can participate on projects as undergraduate research assistants or propose their own research projects to the Undergraduate Research Opportunities Program (UROP) or through the department’s Internship Opportunity Program (IOP) – research (see section VII.6).

The Undergraduate Research Opportunities Program (UROP) offers financial awards twice...
yearly to full-time undergraduates for research, scholarly, or creative projects undertaken in partnership with a faculty member. UROPs provide scholarships of up to $1,500 for approximately 120 hours of research and funds for project-related expenses of up to $300. Applications are accepted twice a year.

Undergraduate students in all colleges are welcome to participate in the program and are able to work with any University faculty member. Applications are judged on the quality of the proposed project and the educational benefit to the student. Although the program is competitive, funding rates are often over 80 percent.

Application deadlines are in late February/early March for Summer/Fall start dates and in early October for Spring start date (see Important Deadlines). More information can be obtained from 511 Bruininks Hall, 222 Pleasant Street SE (hours: M-F 8:30am-4:00pm); 612-625-3853, urop@umn.edu, or online at www.urop.umn.edu.

Students are encouraged to meet with faculty within their areas of interest to explore potential project opportunities. Besides the UROP, some faculty members hire undergraduate research assistants at an hourly wage to assist on their research projects. Also see Section VII.6. Appendix D provides information on how to successfully look for research opportunities.

14. Intern and Cooperative Education (Co-op) Programs and Employment Opportunities
There are numerous opportunities for undergraduates to obtain professional experience through internship and cooperative education work experiences offered by the local professional community. A description of these programs is found in Section VII Intern and Cooperative Education (Co-op) Programs. In addition, the department offers a number of professional development services including assistance with resume writing and interviewing skills through a series of “lunch and learn” seminars and student group events, as well as a career fair hosted by the American Society of Civil Engineering (ASCE) Student Chapter. Students should use these events to explore career opportunities including internships as well as long term employment. These opportunities are in addition to the CSE Career Fairs.

15. Professional Licensure and the Fundamentals of Engineering Exam
Professional licensure is strongly encouraged for individuals seeking careers in engineering. Many employers seek to hire graduates who have successfully passed the Fundamentals of Engineering (FE) exam and are designated Engineers in Training (EITs). The FE Exam is the first of two examinations engineers must pass in order to be licensed as a Professional Engineer. The second exam is the Principles and Practice of Engineering (PE) exam that is typically taken after completing four to six years of qualifying employment experience subsequent to graduation. Students are encouraged to take the Fundamentals of Engineering (FE) Exam in their senior year. Statistics show that they have a greater success rate compared to graduates as the exam covers some of the basic undergraduate course material. The FE is a computer-based exam administered year-round at NCEES-approved test centers. The exams are offered in four “testing windows”: January–March, April–June, July–September, and October–December.

IMPORTANT: Effective May 13, 2019 Board rules allow those who 1. Hold an EAC-ABET accredited bachelor’s degree (or who are within 32 semester credits of holding such a degree), OR 2. Hold an EAC – ABET accredited graduate degree (or have earned 24 semester credits toward such a degree to directly register with NCEES to sit for the FE (no need to first apply to the Board for authorization to sit).
Useful links:
• AELSLAGID website, exam dates and deadlines:  
  http://mn.gov/aelslag/engineering.html
• NCEES website:  
  http://ncees.org/engineering/fe/.

16. Diversity Programs  
There are a number of opportunities including scholarships and organizations devoted to the diverse student body population. More information is available here.

17. Graduate School  
The Department of Civil, Environmental, and Geo- Engineering is dedicated to educating graduate students in the diverse disciplines represented within its degree programs of civil, environmental, and geo-engineering, including the civil engineering emphasis areas of environmental, geomechanics, structural, transportation, and water resources engineering. Graduate study enables a student to develop in-depth knowledge in one or more specialized fields, to reach the frontiers of current knowledge, and to expand those frontiers by doing original research. It also teaches students how to work independently and think critically about one’s own work and that of others. Faculty members help graduate students reach these goals in challenging coursework and research seminars, by encouraging informal discussions, and by providing guidance during all stages of a student’s research.

The department offers integrated Bachelor of Engineering/Master of Science degrees in civil engineering, environmental engineering, and geoengineering. A description of these programs is found in Section IV Bachelor of Engineering/Master of Science Integrated Program. For more information on graduate school, please contact the Director of Graduate Studies, Professor Vaughan Voller, volle001@umn.edu.
II. Bachelor of Civil Engineering (BCE)

Civil engineering deals with the science and art of engineering applied to solving problems and designing systems related to infrastructure and the environment. The main areas of specialization within civil engineering are:

- **Environmental engineering:** The systematic control of air, water, and land pollution to protect the public health and enhance environmental quality by providing for safe water supplies, treatment and disposal of wastewater, and solid waste management systems.
- **Geomechanics:** The analysis of the properties of soils and rocks and applications to the design of foundations, retaining walls, roads, slopes, dams, and tunnels.
- **Structural engineering:** The design and analysis of buildings, bridges, industrial facilities, and other structures built with steel, reinforced or prestressed concrete, masonry, timber, and other materials.
- **Transportation engineering:** The economics, planning, design, construction, maintenance, and administration of transit systems, highways, railroads, airways, pipelines, and transmission lines for the conveyance of passengers, materials, and energy.
- **Water resources engineering:** The application of fluid mechanics, hydrology, and other basic knowledge to the design and operation of water resource systems.

For students with broad interests, **municipal engineering** is concerned with urban and rural infrastructure including specifying, designing, constructing, and maintaining streets, sidewalks, water supply networks, sewers, street lighting, municipal solid waste management and disposal, storage depots for various bulk materials used for maintenance and public works (salt, sand, etc.), public parks and cycling infrastructure, and interacting with the public.

The upper division civil engineering program requires students to take introductory courses in all five areas of specialization. In addition, students may emphasize in one of the areas of specialization by selecting appropriate technical electives in consultation with their faculty adviser. Students who wish to pursue a career in municipal engineering are encouraged to take a broad range of technical electives.

1. **General Requirements**

The four-year program leading to the BCE requires a minimum of 125 credits. The first two years are almost identical to those in other CSE engineering programs. Students may transfer to civil engineering from another CSE engineering program, another University college or campus, or another academic institution provided they meet transfer requirements. All students are required to complete general University and college requirements, including writing and liberal education courses, in order to graduate. For more information about University-wide requirements, see the liberal education requirements. Note that to achieve the minimum of 125 credits, it is assumed that some of the liberal education requirements will be met by “double-dipping” designated liberal education theme courses with liberal education core courses and other courses within the curriculum. Required courses for the major or minor in which a student receives a D grade (with or without plus or minus) or lower do not count toward the major or minor (including transfer courses).
2. Admission Requirements

Students must complete the following starred (*) courses before admission to the BCE program. Freshmen are usually admitted to pre-major status before admission to this major.

It is recommended that students take CEGE 1101, which serves as a technical elective, but this course is not required to be admitted to the program.

Mathematics (16 cr)

- **MATH 1371** - CSE Calculus I [MATH] (4.0 cr)
  - or **MATH 1271** - Calculus I [MATH] (4.0 cr)
- **MATH 1372** - CSE Calculus II (4.0 cr)
  - or **MATH 1272** - Calculus II (4.0 cr)
- * **MATH 2374** - CSE Multivariable Calculus and Vector Analysis (4.0 cr)
  - or **MATH 2263** - Multivariable Calculus (4.0 cr)
- **MATH 2373** - CSE Linear Algebra and Differential Equations (4.0 cr)
  - or **MATH 2243** - Linear Algebra and Differential Equations (4.0 cr)

Honors math (MATH 1571H, 1572H, 2574H, and 2573H, respectively) may be taken in place of the listed courses.

Physical Science and Engineering Science (25-26 cr)

- * **AEM 2011** - Statics (3.0 cr)
- **AEM 3031** - Deformable Body Mechanics (3.0 cr)
- **AEM 2012** - Dynamics (3.0 cr)
  - or **CHEM 2301** - Organic Chemistry I (3.0 cr)
  - or **CSCI 1113** - Introduction to C/C++ Programming for Scientists and Engineers (4.0 cr)
  - or **EE 2001** - Introduction to Circuits and Electronics (3.0 cr)
  - or **MATS 2001** - Introduction to the Science of Engineering Materials (3.0 cr)
  - or **ME 3331** - Thermal Sciences I (3.0 cr)
- **CHEM 1061** - Chemical Principles I [PHYS] (3.0 cr) and
- **CHEM 1065** - Chemical Principles I Laboratory [PHYS] (1.0 cr)
  - or **CHEM 1071H** - Honors Chemistry I [PHYS] (3.0 cr) and
  - **CHEM 1075H** - Honors Chemistry I Laboratory [PHYS] (1.0 cr)
- * **CHEM 1062** - Chemical Principles II [PHYS] (3.0 cr) and
- * **CHEM 1066** - Chemical Principles II Laboratory [PHYS] (1.0 cr)
  - or **CHEM 1072H** - Honors Chemistry II [PHYS] (3.0 cr) and
  - **CHEM 1076H** - Honors Chemistry II Laboratory [PHYS] (1.0 cr)
- **PHYS 1301W** - Introductory Physics for Science and Engineering I [PHYS, WI] (4.0 cr)
  - or **PHYS 1401V** - Honors Physics I [PHYS, WI] (4.0 cr)
- * **PHYS 1302W** - Introductory Physics for Science and Engineering II [PHYS, WI] (4.0 cr)
  - or **PHYS 1402V** - Honors Physics II [PHYS, WI] (4.0 cr)
3. Program Requirements
The upper division program requires courses in environmental sciences, fluid mechanics, soil mechanics, structures, transportation, water resources, and includes engineering design integrated in the curriculum. For course descriptions, see University courses. The credit requirements are as follows:

Civil Engineering Required Core (47 cr)
- CEGE 3101 - Computer Applications in Civil Engineering I (3.0 cr)
- CEGE 3102 - Uncertainty and Decision Analysis in Civil Engineering (3.0 cr)
- CEGE 3201 - Transportation Engineering (3.0 cr)
- CEGE 3301 - Soil Mechanics I (3.0 cr)
- CEGE 3401 - Linear Structural Analysis (3.0 cr)
- CEGE 3402W - Civil Engineering Materials (3.0 cr)
- CEGE 3501 - Environmental Engineering (3.0 cr)
- CEGE 3502 - Fluid Mechanics (4.0 cr)
- CEGE 4101W – Project Management and Engineering Economics (3.0 cr)
- CEGE 4102W - Capstone Design (4.0 cr)
- CEGE 4301 - Soil Mechanics II (3.0 cr)
- CEGE 4401 - Steel and Reinforced Concrete Design (4.0 cr)
- CEGE 4501 - Hydrologic Design (4.0 cr)
- CEGE 4502 - Water and Wastewater Treatment (3.0 cr)

STAT 302I may substitute CEGE 3102 with approval of the director of undergraduate studies.

- CEGE 3103 – Engineering Ethics and Professional Issues (1.0 cr)
- CEGE 3201 - Transportation Engineering (3.0 cr)

Students admitted to the program prior to Fall 2017 are not required to take CEGE 3103 – Engineering Ethics and Professional Issues (1.0 cr) and CEGE 4101W – Project Management and Engineering Economics (3.0 cr), although they are highly recommended as technical electives. For those students, the total number of technical electives are increased to 21 cr.

Technical Electives (17 cr)
Minimum of 17 credits of technical electives are required in the BCE degree program, as follows:
- **Minimum 6 credits of CEGE 4XXX-level or higher** elective courses (not otherwise counted towards your degree requirements).
- The remainder of the 17 technical elective credits can be satisfied by 4XXX-level or higher courses from the College of Science and Engineering (including CEGE). For a comprehensive list of preapproved and recommended technical electives associated with emphasis areas please consult Appendix A. This list includes CEGE 1101, CEGE 3111, CEGE 3202, and CEGE 3541. If you find a course outside of the preapproved list that you wish to take as a technical elective, you must first seek specific approval from your CEGE faculty adviser for it to count towards satisfying this requirement.

Other Basic Science
Accreditation of the CE degree by ABET requires that students take an additional science course outside of physics and chemistry. It is anticipated that students will satisfy this requirement by satisfying the University’s liberal education requirement for a biological sciences course with a laboratory (i.e., BIOL 1001 or BIOL 1009). If not (e.g., in the case of some transfer students), a
biological science or earth science course 3 credits or more can be taken to satisfy this requirement.

4. Final Project
All civil engineering students must complete CEGE 4102W: Capstone Design for Civil Engineering. This course involves an extensive design project to culminate your degree program by applying knowledge that you have learned in your courses to a real world project offered and mentored by professional engineers. The project requires written and oral presentations of project results.

5. Writing Intensive Requirements
CEGE 3402W: Civil Engineering Materials, CEGE 4101W: Project Management and Engineering Economics and CEGE 4102W: Capstone Design for Civil Engineering meet the upper division writing intensive requirement. The requirement can also be met with ENGC 3027: Advanced Expository Writing.

6. Summer Courses
The Department of Civil, Environmental and Geo- Engineering does not typically offer summer courses. CEGE 3202: Surveying and Mapping is typically offered during intersession (and also in fall semester). Students who wish to attend summer classes should include liberal education courses, mathematics, or AEM courses in their summer class schedule.

7. FE Exam
All seniors are strongly encouraged to take the Fundamental of Engineering (FE) examination. For more information, please consult Section I.15 of the handbook.

8. Civil Engineering Degree Program Completion Plan
Once students are admitted to the major, each student selects a faculty adviser in the department. Students must meet with their adviser a minimum of once a semester prior to being cleared for registration to make sure they are on track to complete their degree program in a timely manner. Students should come prepared with a copy of their most recent APAS and any relevant additional information. These advising meetings are useful to discuss opportunities including scholarships, research, internships, co-ops, study abroad, and graduate school.

To assist in planning your courses, samples of the BCE four year program are shown on the following pages. Sample Plan A is preferred for students interested in emphasizing structures or geomechanics because of the longer prerequisite hierarchy.

Please note that **ALL required CEGE courses for the BCE are offered every semester. Many technical elective courses are offered only once a year or less frequently.** As a consequence, please look to take your preferred technical electives when you see them offered if you meet their prerequisite requirements. They may not be offered the semester shown on the plans if you wait to take them. The regular offerings of the required courses make it possible for students to readily take advantage of the co-op program and study abroad opportunities. You are encouraged to discuss these with your faculty adviser.
9. Civil Engineering Sample Program A

This sample plan is preferred for those with a structural engineering or geomechanics emphasis

Freshman Year
Fall Semester (17-18 cr)
CEGE 1101 – Intro to CEGE (1)*
CHEM 1061 – Chem Prin I (3)
CHEM 1065 – Chem Prin I Lab (1)
CSE 1001 – 1st Year Experience (1)
MATH 1371 or MATH 1271 – Calculus I (4)
PHYS 1301W – Intro Physics I (4)
Freshman writing requirement (4)
[WRIT 1301 or 1401]

Spring Semester (16)
CHEM 1062 – Chem Prin II (3)
CHEM 1066 – Chem Prin II Lab (1)
MATH 1372 or MATH 1272 – Calculus II (4)
PHYS 1302W – Intro Physics II (4)
Liberal education elective - Biology (4)
[Biol 1001 or 1009 – preferred course]

Sophomore Year
Fall Semester (16 cr)
AEM 2011 – Statics (3)
CEGE 3101 – Computer Applications I (3)
CEGE 3102 – Uncert. and Decision Analysis (3)
MATH 2374 or MATH 2263 – Multivariable Calculus and Vector Analysis (4)
Liberal education elective (3)

Spring Semester (16 cr)
AEM 3031 – Deform Body Mech (3)
CEGE 3201 – Transportation Engineering (3)
CEGE 3501 – Environmental Engineering (3)
MATH 2373 or MATH 2243 – Linear Algebra and Differential Equations (4)
Liberal education elective (3)

Junior Year
Fall Semester (17 cr)
AEM 2012 – Dynamics (3) **
CEGE 3103 – Engineering Ethics (1)
CEGE 3301 – Soil Mechanics I (3)
CEGE 3401 – Linear Structural Analysis (3)
CEGE 3502 – Fluid Mechanics (4)
Liberal education elective (3)

Spring Semester (16 cr)
CEGE 3402W – Civil Engineering Materials (3)
CEGE 4301 – Soil Mechanics II (3)
CEGE 4401 – Steel & Reinforced Concrete Design (4)
CEGE 4502 – Water/Wastewater Treatment (3)
CEGE technical elective I (3)

Senior Year
Fall Semester (16 cr)
CEGE 4101W – Project Management (3)
CEGE 4501 – Hydrologic Design (4)
CEGE technical elective II (3)
Technical elective I (3 or 4)***
Liberal education elective (3)

Spring Semester (12 cr)
CEGE 4102W – Capstone Design (4)
Technical elective II (3 or 4)***
Technical elective III (3 or 4)***
Technical elective IV (0 to 2)***

*Please note as shown above that CEGE 1101 is optional and could count as 1 technical elective credit.
**AEM 2012 can be replaced with EE 2001, CHEM 2301, CSci 1113, MatS 2001, ME 3331.
***Substitutions can be made upon approval from the student’s faculty adviser.

ALL required CEGE courses for the BCE are offered every semester. Many technical elective courses are offered only once a year or less frequently. As a consequence, please look to take your preferred technical electives when you see them offered if you meet their prerequisite requirements.
10. Civil Engineering Sample Program B

This sample plan is preferred for those with water resources and environmental engineering emphases

**Freshman Year**
*Fall Semester (17-18 cr)*
- CEGE 1101 – Intro to CEGE (1)*
- CHEM 1061 – Chem Prin I (3)
- CHEM 1065 – Chem Prin I Lab (1)
- CSE 1001 – 1st Year Experience (1)
- MATH 1371 or MATH 1271 – Calculus I (4)
- PHYS 1301W – Intro Physics I (4)
- Freshman writing requirement (4)
  [WRIT 1301 or 1401]

*Spring Semester (16 cr)*
- CHEM 1062 – Chem Prin II (3)
- CHEM 1066 – Chem Prin II Lab (1)
- MATH 1372 or MATH 1272 – Calculus II (4)
- PHYS 1302W – Intro Physics II (4)
- Liberal education elective - Biology (4)
  [Biol 1001 or 1009 – preferred course]

**Sophomore Year**
*Fall Semester (16 cr)*
- AEM 2011 – Statics (3)
- CEGE 3101 – Computer Applications I (3)
- CEGE 3501 – Environmental Engineering (3)
- MATH 2374 or MATH 2263 – Multivariable Calculus and Vector Analysis (4)
- Liberal education elective (3)

*Spring Semester (16 cr)*
- AEM 3031 – Deform Body Mechanics (3)
- CEGE 3102 – Uncert. and Decision Analysis (3)
- CEGE 3201 – Transportation Engineering (3)
- MATH 2373 or MATH 2243 – Linear Algebra and Differential Equations (4)
- Liberal education elective (3)

**Junior Year**
*Fall Semester (17 cr)*
- AEM 2012 – Dynamics (3)**
- CEGE 3103 – Engineering Ethics (3)
- CEGE 3402W – Civil Eng. Materials (3)
- CEGE 3502 – Fluid Mechanics (4)
- CEGE 4502 – Water/Wastewater Treatment (3)
- Liberal education elective (3)

*Spring Semester (16 cr)*
- CEGE 3301 – Soil Mechanics I (3)
- CEGE 3401 – Linear Structural Analysis (3)
- CEGE 4101W – Project Management (3)
- CEGE 4501 – Hydrologic Design (4)
- Liberal education elective (3)

**Senior Year**
*Fall Semester (16 cr)*
- CEGE 4301 – Soil Mechanics II (3)
- CEGE 4401 – Steel & Reinforced Concrete Design (4)
- CEGE technical elective I (3)
- CEGE technical elective II (3)
- Technical elective I (3 or 4)***
- Technical elective II (3 or 4)***
- Technical elective III (3 or 4)***
- Technical elective IV (0 to 2)***

*Spring Semester (12 cr)*
- CEGE 4102W – Capstone Design (4)
- Technical elective II (3 or 4)***
- Technical elective III (3 or 4)***
- Technical elective IV (0 to 2)***

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*Please note as shown above that CEGE 1101 is optional and could count as 1 technical elective credit.

**AEM 2012 can be replaced with EE 2001, CHEM 2301, CSci 1113, MatS 2001, ME 3331.

***Substitutions can be made upon approval from the student’s faculty adviser.

ALL required CEGE courses for the BCE are offered every semester. Many technical elective courses are offered only once a year, or less frequently. As a consequence, please look to take your preferred technical electives when you see them offered if you meet their prerequisite requirements.
III. Bachelor of Environmental Engineering (BEnvE)

Environmental engineering deals with the science and art of engineering applied to solving problems and designing systems related to protecting and preserving the environment.

1. General Requirements

The four-year program leading to the BEnvE requires a minimum of 124 credits. The first two years are similar to those in other CSE engineering programs. Students may transfer to environmental engineering from another CSE engineering program, another University college or campus, or another academic institution provided they meet transfer requirements. All students are required to complete general University and college requirements, including writing and liberal education courses, in order to graduate. For more information about University-wide requirements, see the liberal education requirements. Note that to achieve the minimum of 124 credits, it is assumed that some of the liberal education requirements will be met by “double-dipping” designated liberal education theme courses with liberal education core courses and other courses within the curriculum. Required courses for the major or minor in which a student receives a D grade (with or without plus or minus) or lower do not count toward the major or minor (including transfer courses).

2. Admission Requirements

Students must complete the following starred (*) courses before admission to the BEnvE program. Freshman are usually admitted to pre-major status before admission to this major.

Mathematics (16 cr)
- **MATH 1371** - CSE Calculus I [MATH] (4.0 cr)
  - or **MATH 1271** - Calculus I [MATH] (4.0 cr)
- **MATH 1372** - CSE Calculus II (4.0 cr)
  - or **MATH 1272** - Calculus II (4.0 cr)
- * **MATH 2374** - CSE Multivariable Calculus and Vector Analysis (4.0 cr)
  - or **MATH 2263** - Multivariable Calculus (4.0 cr)
- **MATH 2373** - CSE Linear Algebra and Differential Equations (4.0 cr)
  - or **MATH 2243** - Linear Algebra and Differential Equations (4.0 cr)

Honors math (MATH 1571H, 1572H, 2574H, and 2573H, respectively) may be taken in place of the listed courses.

Physical Science and Engineering Science (25 cr)
- * **AEM 2011** - Statics (3.0 cr)
- **AEM 3031** - Deformable Body Mechanics (3.0 cr)
- **CHEM 1061** - Chemical Principles I [PHYS] (3.0 cr) and
  - **CHEM 1065** - Chemical Principles I Laboratory [PHYS] (1.0 cr)
  - or **CHEM 1071H** - Honors Chemistry I [PHYS] (3.0 cr) and
    - **CHEM 1075H** - Honors Chemistry I Laboratory [PHYS] (1.0 cr)
- **CHEM 1062** - Chemical Principles II [PHYS] (3.0 cr) and
  - or **CHEM 1066** - Chemical Principles II Laboratory [PHYS] (1.0 cr)
  - or **CHEM 1072H** - Honors Chemistry II [PHYS] (3.0 cr) and
    - **CHEM 1076H** - Honors Chemistry II Laboratory [PHYS] (1.0 cr)
- * **CHEM 2301** - Organic Chemistry I (3.0 cr)
PHYS 1301W - Introductory Physics for Science and Engineering I [PHYS, WI] (4.0 cr)
* PHYS 1401V - Honors Physics I [PHYS, WI] (4.0 cr)
* PHYS 1302W - Introductory Physics for Science and Engineering II [PHYS, WI] (4.0 cr)
* PHYS 1402V - Honors Physics II [PHYS, WI] (4.0 cr)

3. Program Requirements
The upper division program requires courses in thermodynamics, earth sciences, soil mechanics, fluid mechanics, water resources, materials, water/wastewater treatment, and includes engineering design integrated in the curriculum. For course descriptions, see University courses. The credit requirements are as follows:

Environmental Engineering Required Core (39 cr)
CEGE 3101 - Computer Applications in Civil Engineering I (3.0 cr)
CEGE 3102 - Uncertainty and Decision Analysis in Civil Engineering (3.0 cr)
STAT 3021 may substitute CEGE 3102 with approval of the director of undergraduate studies.
CEGE 3103 – Engineering Ethics and Professional Practice (1.0 cr)
CEGE 3301 - Soil Mechanics I (3.0 cr)
CEGE 3402W - Civil Engineering Materials (3.0 cr)
CEGE 3501 - Environmental Engineering (3.0 cr)
CEGE 3502 - Fluid Mechanics (4.0 cr)
CEGE 3541 – Environmental Engineering Laboratory (3.0 cr)
CEGE 4101W – Project Management and Engineering Economics (3.0 cr)
CEGE 4102W - Capstone Design (4.0 cr)
CEGE 4501 - Hydrologic Design (4.0 cr)
CEGE 4502 - Water and Wastewater Treatment (3.0 cr)
CHEM 4501 – Introduction to Thermodynamics, Kinetics, and Stat Mechanics (3.0 cr)
ESCI course (3.0 cr)
- Take any one ESCI course three credits or higher. Courses used to meet this requirement may not be used to meet another major requirement.
- ESCI 1007 can be used to fulfill this requirement or the Biological Sciences requirement but not both.
- ESCI 3303W, ESCI 3402, ESCI 3425, ESCI 4702, and ESCI 4801 can be used to fulfill this requirement or the Environmental Science and Policy (ESP) elective but not both.

Engineering Science and Design (ESD) Electives (9 cr), choose from:
CEGE 4351: Groundwater Mechanics (3.0 cr)
CEGE 4511: Hydraulic Structures (3.0 cr)
CEGE 4512: Open Channel Hydraulics (4.0 cr)
CEGE 4513: Energy Conversion from Wind, Hydro, and Solar Resources (3.0 cr)
- or CEGE 5513: Energy Conversion from Wind, Hydro, and Solar Resources (3.0 cr)
CEGE 4561: Solid and Hazardous Wastes (3.0 cr)
- or BBE 4533: Sustainable Waste Management (3.0 cr)
CEGE 4562: Environmental Remediation Technology (3.0 cr)
CEGE 4563: Pollutant Fate and Transport: Processes and Modeling (3.0 cr)
CEGE 5511: Urban Hydrology and Water Quality (4.0 cr)
CEGE 5512: Stochastic Hydrology (3.0 cr)
**CEGE 5541**: Environmental Water Chemistry (3.0 cr)
**CEGE 5543**: Introductory Environmental Fluid Mechanics (4.0 cr)
**CEGE 5551**: Environmental Microbiology (3.0 cr)

*or BBE 4608*: Environmental and Industrial Microbiology (3.0 cr)

*Neither can be taken if credit is earned for ESCI 4801 or BIOL 4121.*

**BBE 4523**: Ecological Engineering Design (3.0 cr)
**BBE 4535**: Assessment and Diagnosis of Impaired Waters (3.0 cr)
**BBE 4753**: Air Quality and Pollution Control Engineering (3.0 cr)

Environmental Science and Policy (ESP) Electives (3 cr), choose from:
**EEB 3407**: Ecology (3.0 cr)
*or EEB 3408W*: Ecology (3.0 cr)
**EEB 5601**: Limnology (3.0 cr)
**ESCI 3303W**: Geochemical Principles (4.0 cr)
**ESCI 3402**: Science and Politics of Global Warming (3.0 cr)
**ESCI 4702**: General Hydrogeology (3.0 cr)
**ESCI 4801**: Geomicrobiology (3.0 cr)

*or BIOL 4121*: Microbial Ecology and Applied Microbiology (3.0 cr)

*Neither can be taken if credit is earned for CEGE 5551 or BBE 4608.*

**ESPM 3245**: Sustainable Land Use Planning and Policy (3.0 cr)
**ESPM 3425**: Atmospheric Pollution: From Smog to Climate Change (3.0 cr)
**ESPM 3603**: Environmental Life Cycle Analysis (3.0 cr)
**ESPM 3777**: Climate Change – Physics, Myths, Mysteries, and Uncertainties (3.0 cr)
**GCC 5005**: Global Venture Design – What Impact Will You Make? (3.0 cr)
**LAAS 5311**: Soil Chemistry and Mineralogy (3.0 cr)
**PA 5711**: Science, Technology, and Environmental Policy (3.0 cr)
**WRS 5101**: Water Policy (3.0 cr)

*or PA 5723*: Water Policy (3.0 cr)

Students admitted to the program prior to Fall 2017 are not required to take CEGE 3103 – *Engineering Ethics and Professional Issues* (1.0 cr) and CEGE 4101W – *Project Management and Engineering Economics* (3.0 cr), although they are highly recommended as technical electives.

**Technical Electives (9 cr)**
The remainder of the 21 credit technical elective requirements can be satisfied by taking additional ESD or ESP courses, by taking any 4xxx-level or higher courses from the College of Science and Engineering (including CEGE), or by taking pre-approved and recommended technical electives listed in Appendix A. In addition, you may take courses offered at other levels (3000-level or lower) or by other colleges (especially, but not limited to CFANS and CBS) if approved by your CEGE faculty adviser.

**Biological Sciences**
Accreditation of the BEnvE degree by ABET requires that students take a biological science course. It is anticipated that students will satisfy this biological sciences requirement while...
satisfying the University’s liberal education requirement for a biological sciences course with a laboratory (i.e., BIOL 1001 or BIOL 1009). If not, a course that also satisfies other BEnvE elective requirements (e.g., CEGE 5551, ESCI 4801, BBE 4608, BIOL 4121, or EEB 3407 or EEB 3408W), can be taken. Other courses can be used to satisfy this requirement upon approval of the Director of Undergraduate Studies.

4. Final Project
All environmental engineering students must complete CEGE 4102W: Capstone Design. This course is an extensive design project culminating your education by applying knowledge that you have learned in your degree program to a real world project offered and mentored by professional engineers from our local community. The project requires written and oral presentations of project results.

5. Writing Intensive Requirements

6. Summer Courses
The Department of Civil, Environmental and Geo-Engineering does not typically offer summer courses. CEGE 3202: Surveying and Mapping is typically offered during intersession (and also in fall semester). Students who wish to attend summer classes should include liberal education courses, mathematics, chemistry, or AEM courses in their summer class schedule.

7. FE Exam
All seniors are strongly encouraged to take the Fundamental of Engineering (FE) examination. For more information, please consult Section I.15 of the handbook.

8. Environmental Engineering Degree Program Completion Plan
Once students are admitted to the major, each student selects a faculty adviser in the environmental engineering area of emphasis within the department. Students must meet with their adviser a minimum of once a semester prior to being cleared for registration, to make sure they are on track to complete their degree program in a timely manner. Students should come prepared with a copy of their most recent APAS and any relevant additional information. These advising meetings are useful to discuss opportunities including scholarships, research, internships, co-ops, study abroad, and graduate school.

To assist in planning your courses, a sample of the BEnvE four year program is shown on the following page.

Please note that EXCEPT for CEGE 3541, required CEGE courses for the BEnvE are offered every semester. Many technical elective courses are offered only once a year or less frequently. As a consequence, please look to take your preferred electives when you see them offered if you meet their prerequisite requirements. They may not be offered the semester shown on the plan if you wait to take them. The regular offerings of the required courses make it possible for students to readily take advantage of the co-op program and study abroad opportunities. You are encouraged to discuss these with your faculty adviser.
9. Environmental Engineering Sample Program

Freshman Year

*Fall Semester (17-18 cr)*
- CEGE 1101 – Intro to CEGE (1)*
- CHEM 1061 – Chem Prin I (3)
- CHEM 1065 – Chem Prin I Lab (1)
- CSE 1001 – 1st Year Experience (1)
- MATH 1371 or MATH 1271 – Calculus I (4)
- PHYS 1301W – Intro Physics I (4)
- Freshman writing requirement (4)  
  [WRIT 1301 or 1401]

*Spring Semester (16 cr)*
- CHEM 1062 – Chem Prin II (3)
- CHEM 1066 – Chem Prin II Lab (1)
- MATH 1372 or MATH 1272 – Calculus II (4)
- PHYS 1302W – Intro Physics II (4)
- Liberal education elective - Biology (4)  
  [Biol 1001 or 1009 – preferred course]

Sophomore Year

*Fall Semester (16 cr)*
- AEM 2011 – Statics (3)
- CEGE 3501 – Environmental Engineering (3)
- CHEM 2301 – Organic Chemistry (3)
- MATH 2374 or MATH 2265 – Multivariable Calculus and Vector Analysis (4)
- Liberal education course (3)

*Spring Semester (16 cr)*
- AEM 3031 – Deform Body Mechanics (3)
- CEGE 3101 – Computer Appl I (3)
- MATH 2373 or MATH 2243 – Linear Algebra and Differential Equations (4)
- Liberal education course (3)

Junior Year

*Fall Semester (16 cr)*
- CEGE 3102 – Uncertainty/Decision Analy. (3)
- CEGE 3502 – Fluid Mechanics (4)
- CEGE 3541 – Environmental Eng. Lab (3)
- CEGE 4502 – Water/Wastewater Treatment (3)
- ESCI course (3)

*Spring Semester (17 cr)*
- CEGE 3103 – Engineering Ethics (1)
- CEGE 3301 – Soil Mechanics I (3)
- CEGE 4101W – Project Management (3)
- CEGE 4501 – Hydrologic Design (4)
- ESD, ESP, or technical electives** (3)  
  Liberal education course (3)

Senior Year

*Fall Semester (15 cr)*
- CEGE 3402W – Civil Eng. Materials (3)
- ESD, ESP, or technical electives** (9)
- Liberal education course (3)

*Spring Semester (13 cr)*
- CEGE 4103W – Capstone Design (4)
- ESD, ESP, or technical electives** (9)

*Please note as shown above that CEGE 1101 is optional and could count as 1 technical elective credit.

**Minimum of 21cr of technical electives, which include minimum of 9cr Engineering Science and Design (ESD) Electives and minimum of 3cr Environmental Science and Policy (ESP) Electives. Substitutions can be made upon approval from the student’s faculty adviser.

Except for CEGE 3541, CEGE required courses for the BEnvE are offered every semester. Many technical elective courses are offered only once a year or less frequently. As a consequence, please look to take your preferred technical electives when you see them offered if you meet their prerequisite requirements.
IV. Bachelor of Geoengineering (BGeoE)

Geoengineering deals with the discovery, development, and environmentally responsible production of surface and subsurface earth resources. A geoengineer applies the principles of engineering and science to the problems of planning, analysis, design, construction, and operation of facilities on and under the surface of the Earth. One type of geoengineer is a geological engineer, which refers primarily to someone who works on the pursuit of mineral resources, but geoengineering encompasses a wider range of earth resources. For example, a student graduating with a degree in geoengineering may pursue a career in underground exploration for resources such as oil and gas; underground storage of petroleum and natural gas; CO₂ sequestration; underground transportation systems; supply of drinking water from groundwater; isolation of nuclear and other hazardous wastes; land reclamation associated with surface and subsurface mining. Geoengineers are involved with prediction and control of unstable dynamic releases of energy as in damaging rock bursts in mines. Geoengineers develop improved recovery of petroleum resources and study the consequences of disposal of unwanted fluids injected into rock formations at depth.

Our geoengineering degree program has three areas of emphasis:

- **Geoenvironmental**, which focuses on (1) soil and groundwater contamination and remediation; (2) solid and hazardous waste characterization, management, and disposal;
- **Geofluids**, which focuses on (1) groundwater modeling; (2) groundwater and surface water resources management and exploitation.
- **Georesources**, which focuses on (1) analysis and design of surface and subsurface excavations; (2) evaluation of natural geologic hazards.

The upper division geoengineering program requires students to take introductory courses in each of these three areas. In addition, students may emphasize a special interest in one of the areas by selecting appropriate technical electives in consultation with their faculty adviser.

1. General Requirements

The four-year program leading to the BGeoE requires a minimum of 125 credits including 67 credits within three major fields: civil engineering, geoengineering, and earth sciences. The first two years of the geoengineering curriculum are almost identical with the first two years of the civil engineering program and are similar to those in other CSE engineering programs. Students may transfer to geoengineering from another CSE engineering program, another University college or campus, or another academic institution provided they meet transfer requirements. All students are required to complete general University and college requirements, including writing and liberal education courses, in order to graduate. For more information about University-wide requirements, see the liberal education requirements. Note that to achieve the minimum of 125 credits, it is assumed that some of the liberal education requirements will be met by “double-dipping” designated liberal education theme courses with liberal education core courses and other courses within the curriculum. Required courses for the major or minor in which a student receives a D grade (with or without plus or minus) or lower do not count toward the major or minor (including transfer courses).

It is also possible to complete a combined degree program in ESCI/GeoE. The minimum total credits needed for both degrees in 136. Please see Appendix E for a sample plan.
2. Admission Requirements
Students must complete the following starred (*) courses before admission to the BGeoE program. Freshman are usually admitted to pre-major status before admission to this major.

It is recommended that students take CEGE 1101, which serves as a technical elective, but this course is not required to be admitted to the program.

Mathematics (16 credits)
- MATH 1371 - CSE Calculus I [MATH] (4.0 cr)
  or MATH 1271 - Calculus I [MATH] (4.0 cr)
- MATH 1372 - CSE Calculus II (4.0 cr)
  or MATH 1272 - Calculus II (4.0 cr)
- * MATH 2374 - CSE Multivariable Calculus and Vector Analysis (4.0 cr)
  or MATH 2263 - Multivariable Calculus (4.0 cr)
- MATH 2373 - CSE Linear Algebra and Differential Equations (4.0 cr)
  or MATH 2243 - Linear Algebra and Differential Equations (4.0 cr)
Honors math (MATH 1571H, 1572H, 2574H, and 2573H, respectively) may be taken in place of the listed courses.

Physical Science and Engineering Science (25-26 cr)
- * AEM 2011 - Statics (3.0 cr)
- AEM 3031 - Deformable Body Mechanics (3.0 cr)
- * AEM 2012 - Dynamics (3.0 cr)
  or CHEM 2301 - Organic Chemistry I (3.0 cr)
  or CSCI 1113 - Introduction to C/C++ Programming for Scientists and Engineers (4.0 cr)
  or EE 2001 - Introduction to Circuits and Electronics (3.0 cr)
  or MATS 2001 - Introduction to the Science of Engineering Materials (3.0 cr)
  or ME 3331 - Thermal Sciences I (3.0 cr)

- CHEM 1061 - Chemical Principles I [PHYS] (3.0 cr) and
- CHEM 1065 - Chemical Principles I Laboratory [PHYS] (1.0 cr)
  or CHEM 1071H - Honors Chemistry I [PHYS] (3.0 cr) and
  CHEM 1075H - Honors Chemistry I Laboratory [PHYS] (1.0 cr)
- * CHEM 1062 - Chemical Principles II [PHYS] (3.0 cr) and
- * CHEM 1066 - Chemical Principles II Laboratory [PHYS] (1.0 cr)
  or CHEM 1072H - Honors Chemistry II [PHYS] (3.0 cr) and
  CHEM 1076H - Honors Chemistry II Laboratory [PHYS] (1.0 cr)

- PHYS 1301W - Introductory Physics for Science and Engineering I [PHYS, WI] (4.0 cr)
  or PHYS 1401V - Honors Physics I [PHYS, WI] (4.0 cr)
- * PHYS 1302W - Introductory Physics for Science and Engineering II [PHYS, WI] (4.0 cr)
  or PHYS 1402V - Honors Physics II [PHYS, WI] (4.0 cr)
### 3. Program Requirements

The *upper division* program requires courses in earth sciences, civil and geoengineering. The curriculum includes courses in soil mechanics, fluid mechanics, water resources, environmental sciences, earth science, and engineering design. Students are also required to select appropriate technical elective courses. For course descriptions, see [University courses](#). The credit requirements are as follows:

#### Earth Sciences Core (19-20 cr)

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<th>Course</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>ESCI 2201</td>
<td>Solid Earth Dynamics</td>
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<tr>
<td>ESCI 2301</td>
<td>Mineralogy</td>
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ESCI Core Technical Elective, at least one of the following two courses:

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<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESCI 2302</td>
<td>Petrology</td>
<td>3.0</td>
</tr>
<tr>
<td>or ESCI 2203 – Earth Surface Dynamics</td>
<td>4.0</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESCI 3891</td>
<td>Field Methods</td>
<td>2.0</td>
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<table>
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<th>Credits</th>
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<tbody>
<tr>
<td>ESCI 3911</td>
<td>Introductory Field Geology</td>
<td>4.0</td>
</tr>
<tr>
<td>or ESCI 4971W – Field Hydrogeology</td>
<td>4.0</td>
<td></td>
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<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>ESCI 4501</td>
<td>Structural Geology</td>
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#### CEGE Core (34 cr)

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<tr>
<td>CEGE 3101</td>
<td>Computer Applications in Civil Engineering I</td>
<td>3.0</td>
</tr>
<tr>
<td>CEGE 3102</td>
<td>Uncertainty and Decision Analysis in Civil Engineering</td>
<td>3.0</td>
</tr>
<tr>
<td>CEGE 3103</td>
<td>Engineering Ethics and Professional Practice</td>
<td>1.0</td>
</tr>
<tr>
<td>CEGE 3301</td>
<td>Soil Mechanics I</td>
<td>3.0</td>
</tr>
<tr>
<td>CEGE 3501</td>
<td>Environmental Engineering</td>
<td>3.0</td>
</tr>
<tr>
<td>CEGE 3502</td>
<td>Fluid Mechanics</td>
<td>4.0</td>
</tr>
<tr>
<td>CEGE 4101W – Project Management and Engineering Economics</td>
<td>3.0</td>
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<tr>
<td>CEGE 4104W – Capstone Design</td>
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<td></td>
</tr>
<tr>
<td>CEGE 4121</td>
<td>Computer Applications in Civil Engineering II</td>
<td>3.0</td>
</tr>
<tr>
<td>CEGE 4311</td>
<td>Rock Mechanics</td>
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<tr>
<td>CEGE 4351</td>
<td>Groundwater Mechanics</td>
<td>3.0</td>
</tr>
</tbody>
</table>

#### Technical Electives (14 cr)

1. At least one ESCI Core Technical Elective; choose from:
   - ESCI 2302 - Petrology (3.0 cr)
   - or ESCI 2203 – Earth Surface Dynamics (4.0 cr)

At least one 3 credit ESCI course at the 4XXX-level or greater

At least one CEGE course from the following list:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CEGE 4301</td>
<td>Soil Mechanics II</td>
<td>3.0</td>
</tr>
<tr>
<td>CEGE 4501</td>
<td>Hydrologic Design</td>
<td>4.0</td>
</tr>
<tr>
<td>CEGE 4502</td>
<td>Water and Wastewater Treatment</td>
<td>3.0</td>
</tr>
</tbody>
</table>

The remainder of the 14 technical elective credits can be satisfied by taking 4XXX-level or higher courses from the College of Science and Engineering (including CEGE and ESCI). For a comprehensive list of preapproved and recommended technical electives associated with emphasis areas please consult [Appendix A](#). If you find a course outside of the preapproved list that you wish to take as a technical elective, you must first seek specific approval from Prof. Randal Barnes (geoengineering faculty adviser) for it to count towards satisfying this requirement.
Students admitted to the program prior to Fall 2017 are not required to take CEGE 3103 – Engineering Ethics and Professional Issues (1.0 cr) and CEGE 4101W – Project Management and Engineering Economics (3.0 cr), although they are highly recommended as technical electives.

4. Final Project
All geoengineering students must complete CEGE 4104W: Capstone Design for Geoengineering. This course involves an extensive design project to culminate your degree program by applying knowledge that you have learned in your courses to a real world project offered and mentored by professional engineers. The project requires written and oral presentations of project results.

5. Writing Intensive Requirements
CEGE 3402W: Civil Engineering Materials, CEGE 4101W: Project Management and Engineering Economics, and CEGE 4104W: Capstone Design for Geoengineering meet the upper division writing intensive requirement. The requirement can also be met with ENGC 3027: Advanced Expository Writing.

6. Summer Courses
The Department of Civil, Environmental and Geo- Engineering does not offer summer courses. CEGE 3202: Surveying and Mapping is offered during intersession (and also in fall semester). Students who wish to attend summer classes should include liberal education courses, mathematics, or AEM courses in their summer class schedule.

7. FE Exam
All seniors are strongly encouraged to take the Fundamental of Engineering (FE) examination. For more information, please see consult Section I.15 of the handbook.

8. Geoengineering Degree Program Completion Plan
If you have any questions about the geoengineering degree program please contact Professor Randal Barnes at (612) 626-0311 or email him at barne003@umn.edu. Students must meet with Prof. Barnes a minimum of once a semester prior to being cleared for registration to make sure they are on track to complete their degree program in a timely manner. Students should come prepared with a copy of their more recent APAS and any relevant additional information. These advising meetings are useful to discuss opportunities including scholarships, research, internships, co-ops, study abroad, and graduate school.

To assist in planning your courses, a generic sample of the BGeoE four year program is shown on the following page. Many, but not all, required CEGE courses are offered every semester. Many of the ESCI courses are offered only once a year. Look at the course offerings carefully and the prerequisite hierarchy to ensure that you can complete your degree in an efficient and timely manner. Because many technical elective courses are offered only once a year, or less frequently, please look to take your preferred technical electives when you see them offered if you meet their prerequisite requirements.
9. Geoengineering Sample Program – Generic

Freshman Year

Fall Semester (17-18 cr)
CEGE 1101 – Intro to CEGE (1)*
CHEM 1061 – Chemical Prin I (3)
CHEM 1065 – Chem Prin I Lab (1)
CSE 1001 – 1st Year Experience (1)
MATH 1371 or MATH 1271 – Calculus I (4)
Liberal education elective (3)

Spring Semester (16 cr)
CHEM 1062 – Chemical Prin II (3)
CHEM 1066 – Chem Prin II Lab (1)
MATH 1372 or MATH 1272 – Calculus II (4)
PHYS 1302W – Intro Physics II (4)

Freshman writing requirement (4) [WRIT 1301 or 1401]

Sophomore Year

Fall Semester (17 cr)
AEM 2011 – Statics (3)
ESCI 2201 – Solid Earth Dynamics I (4)
ESCI 2301 – Mineralogy (3)
MATH 2374 (2263) – Multivariable Calculus (4)
Liberal education elective (3)

Spring Semester (15 cr)
AEM 3031 – Deform Body Mech (3)
ESCI 3011 – Computer Applications I (3)
ESCI 3891 – Field Methods (2)
MATH 2373 (2243) – Lin Alg & Diff Eqns (4)

Liberal education elective (3)

Summer Session (4 cr)
ESCI 3911 or ESci 4971W – Field geology (4)

Junior Year

Fall Semester (15 cr)
AEM 2012 – Dynamics (3)**
CEGE 3301 – Soil Mechanics I (3)
CEGE 3501 – Environmental Eng (3)
ESCI 4501 – Structural Geology (3)
Liberal education elective (3)

Spring Semester (17-19 cr)
CEGE 3102 – Uncert. and Decision Analysis (3)
CEGE 3103 – Engineering Ethics (1)
CEGE 3502 – Fluid Mechanics (4)
CEGE 4121 – Computer Apps II (3)
ESCI Core Technical Elective:
ESIC 2302 – Petrology (3)
or ESCI 2203 – Earth Surface Dynamics (4)
Technical elective I (3-4)***

Senior Year

Fall Semester (13-14 cr)
CEGE 4101W – Project Management (3)
CEGE 4311 – Rock Mechanics (4)
CEGE 4351 – Groundwater Mechanics (3 cr)
ESCI Technical elective (3-4)***

Spring Semester (10-13 cr)
CEGE 4104W – Capstone Design (4)
CEGE Technical elective (3-4)***
Technical elective II (0-2)***

Liberal education elective (3)

*Please note that CEGE 1101 is optional and could count as 1 technical elective credit.

**AEM 2012 can be replaced with EE 2001, CHEM 2301, CSci 1113, MatS 2001, ME 3331.

***Minimum of 14 cr of Technical Electives which include:
At least one of the following ESCI Core Technical Electives:
ESCI 2302 – Petrology (3.0 cr)
ESCI 2203 – Earth Surface Dynamics (4.0 cr)
At least one 3 credit ESCI Technical Elective at the 4XXX-level or greater.
At least one of the following CEGE Technical Electives:
CEGE 4301 – Soil Mechanics II (3.0 cr)
CEGE 4501 - Hydrologic Design (4.0 cr)
CEGE 4502 - Water and Wastewater Treatment (3.0 cr)
V. Bachelor of Engineering/Master of Science Integrated Program

1. BCE/MS, BEnvE/MS, or BGeoE/MS
The department offers combined degree programs that allow students to complete both a Bachelor's and Master's degree in a total of five years. The programs include Civil Engineering (CE/MS), Environmental Engineering (EnvE/MS), and Geo-Engineering (GeoE/MS).

Requirements:
- 125 credits to fulfill Undergraduate Program Requirements
  - Civil Engineering
  - Environmental Engineering
  - Geoengineering
- 30 Graduate Credits to fulfill Master’s Program Requirements
  - Plan A – 20 course credits plus 10 thesis credits
  - Plan B – 27 course credits plus 3 research credits (CEGE 8094)
  - Plan C – 30 course credits

The combined degree program offers several advantages:
- Master's degree can make graduates more competitive for higher-paying positions.
- Students can work toward their undergraduate and graduate degrees simultaneously, which means that they may be able to finish the Master's degree and enter the job market a full year earlier than students in conventional two-year Master's programs.
- Students save money because they are able to complete graduate credits (up to 16 graduate credits) at the undergraduate tuition rate during their senior year.

2. Prerequisites/Criteria for Admission
- Only current students in the Civil, Environmental, and Geo- Engineering Undergraduate Programs at the University of Minnesota are eligible to apply for this program. (Students from other programs or universities should visit the How to Apply page for instructions on how to apply for our MS and PhD programs.)
- Students apply in the second semester of their junior year. Students who are in the last semester of their senior year are not eligible to apply.
- Students must have a Master’s faculty adviser selected prior to admission for Plan A or Plan B options.
- One (1) letter of recommendation from Master’s faculty adviser for Plan A or Plan B options, or from CEGE undergraduate faculty adviser applying for Plan C option.
- Applicants must have a 3.3 GPA or higher to be admitted.
- GRE is not required.
3. How to Apply:

Materials:  How to Submit:

Application for Graduate Admissions Go to the University of Minnesota on-line application.

Complete all the required fields:

- Program Selection
  - Civil Engineering MS
  - Geoengineering MS
- Term Selection
- Biological Information
- Personal Background
- Civil and Geo Engineering Supplemental Material
  - If civil engineering select your interest area
  - Check yes to the question are you applying to the combined Bachelor’s/Master’s program
- Academic History
- Test scores
  - You should have none
- Employment
- Materials
  - Personal Statement
    - Please include in the statement that you want to do the combined BS/MS program
  - Diversity Statement if necessary
  - Extenuating Circumstances Statement if necessary
  - Resume/CV
  - Graduate Program Additional Material
  - Course Planning Worksheet (Appendix C)
    - Must be completed and uploaded into this section
- One letter of recommendation
  - If doing a Plan A or B, the letter should come from your Master’s adviser
  - If doing a plan C, the letter should come from your CEGE faculty adviser

All materials must be submitted into the online application. Once you submit, your application is final. No changes or additions will be accepted.

Application Fee

$75 for U.S. applicants, $95 for international applicants. This fee cannot be waived or deferred. Click here for more information on the application fee.

Transcripts

Unofficial transcripts or academic records must be uploaded directly to the online application. Instructions for uploading transcripts are available here.
International students should also upload an English translation if the transcript is not in English. [Click here](#) for more information on international transcripts and credentials.

Please do NOT mail in paper copies of your transcripts, as this may cause serious delays in the processing of your application!

There is no need for official transcripts or academic records for initial review. If you are admitted, the University will then request official copies of this material. See the [Graduate School’s Application Information](#) for more details.

<table>
<thead>
<tr>
<th><strong>GRE</strong></th>
<th>Not Required for the Combined Program.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>English Language test scores</strong> (TOEFL,MELAB,IELTS)</td>
<td>Not Required for the Combined Program.</td>
</tr>
</tbody>
</table>

**Statement #1**

Provide a statement outlining your immediate educational goals and long-range career objectives in relation to your chosen field and that you want to be considered for the bachelor/masters combined program. If there is a particular faculty member with whom you wish to study, please give that person's name and explain why you want to study with that person. You may also wish to include other information, such as any undergraduate research, internships, or other experiences to document your preparation for advanced study in your chosen field.

**Statement #2 (OPTIONAL)**

Enrolling and graduating a diverse student body is central to the University of Minnesota's mission. Please write a statement that identifies the distinctive qualities, characteristics, and life experiences you would contribute to your graduate program and to the education of fellow students at the University of Minnesota. You may wish to include examples that address your contribution to the diversity of the student body and illustrate your motivation to succeed by setting high standards for accomplishing intellectual and other goals, overcoming obstacles to achievement, and/or helping others to gain access to the resources necessary for success.

Note: For US Citizens and Permanent Residents, this statement will be used to determine if you are eligible to be nominated by the admissions committee for a [Diversity of Views and Experiences Fellowship](#) (DOVE Fellowship). Your statement should indicate how your background, experiences, and achievements will contribute to the University's goal of promoting excellence through diversity. If applicable, nominees should mention hardships or obstacles that they have overcome to complete their undergraduate education.

**Description of Research or Work Experience**

Not required for the Combined Program.

**Writing Sample**

Not required for the Combined Program.

**Resume or CV**

Upload your resume or CV in PDF format. **Do not upload more than one copy.**
Letters of Recommendation

One letter of recommendation are required. Acceptable recommendations will come from current or former professors who can assess your potential for graduate work. Additional referees, such as employers, are also acceptable.

- MS Plan A or B students should submit a letter from their MS faculty adviser
- MS Plan C students should submit a letter from their Bachelors faculty adviser
- The application will not let you submit your application without 3 recommendation letters. For the other two recommendation slots, you can put any two email addresses. Just not your own U of MN email address. You can use tralston@umn.edu and cegesps@umn.edu.

All letters must be submitted online.

Paper copies will NOT be accepted.

Departmental program form within application

There will be a section within the departmental program form where you have pick your major program and degree. Pick your major Civil Engineering or Geoengineering.

If you pick civil engineering, please pick your interest area.
- Environmental
- Geomechanics
- Structures
- Transportation or
- Water Resources

Check yes that you are applying to the combined Bachelor/Master’s degree program.

4. Deadlines

Fall Admission

The deadline to submit the application form is June 1.

Applicants will be notified of their admission status by July 1.

Spring Admission

The deadline to submit the application form is August 31.

Applicants will be notified of their admission status by November 1.

5. Financial Support

Departmental support is typically not offered to students in the Combined Degree Program. Students are encouraged to seek external financial aid (scholarships, loans, etc.).
6. More Information

- Courses applied towards your bachelor’s degree cannot be used towards your Master’s degree. You cannot “double dip.”

- Graduate courses taken while you are an undergrad MUST appear in your APAS in the “Elective courses currently not applicable to this degree program.”

- To “transfer” the courses to your master’s degree, you will need to fill out a graduate degree plan AND the transfer credits from undergraduate to graduate career form. You will fill out this graduate degree plan after you graduate with your bachelor’s degree and start your first semester as a grad student (you are not officially in the MS program until this point). All graduate classes you intend to use for your degree must be on this form including the ones taken as an undergrad and signed by your Master’s adviser.

- **IMPORTANT – Prior to graduating with your BCE, BEnvE or BGeoE degree, you must have the Director of Undergraduate Studies check your APAS report relative to your graduate degree plan to ensure that the courses that you plan to apply toward your BE and MS degrees are in the correct categories on your APAS report.**

- All combined degree students must attend graduate orientation and complete the ethics training before fall semester starts either when you get admitted into the combined program or when you start your first semester as a graduate student after completion of the Bachelor’s requirements.

- You cannot delay completion of your Bachelor’s degree to accommodate your MS degree.

- You are only allowed two 4xxx level courses to be used for your MS degree. No Exceptions.

- You are not considered a graduate student until you graduate with your Bachelor’s degree. Any graduate paperwork will not be able to be processed until your first official semester as a grad student, which is the next semester after your bachelor’s graduation.
VI. Honors Program

1. Introduction
The University Honors Program (UHP) serves all undergraduate honors students at the University of Minnesota - Twin Cities, aiding them in their creation of an enriched, interdisciplinary educational experience. Comprising roughly ten percent of the University’s undergraduate population, honors students excel both in the classroom and outside of it. Information on the University Honors Program can be found on their website.

Students, including transfer students from other institutions, may enter the program as sophomores and juniors, provided they have four semesters remaining until their expected graduation date. Students apply to UHP in their freshman and sophomore year (rising sophomore and junior respectively) for a Fall admission.

2. Why Participate?
Why should a Civil, Environmental, or Geo- Engineering student at the University of Minnesota participate in the University Honors Program during their junior and senior years? At the University of Minnesota, the Latin Honors designations *cum laude* (“with honor”), *magna cum laude* (“with great honor”), and *summa cum laude* (“with highest honor”) are only earned by participating in the University Honors Program.

Not every eligible student should participate in UHP, but those that do will enrich their undergraduate experience, and graduate with a Latin Honors designation that will be part of their professional resume for the rest of their lives.

3. Requirements
All students must meet the GPA requirements mandated by University policy for the appropriate level of Latin Honors:

*cum laude* 3.500–3.665 GPA  
*magna cum laude* 3.666–3.749 GPA  
*summa cum laude* 3.75–4.0 GPA

based on the last 60 graded credits. The GPA of the last 60 graded credits and the nature of the senior-year project will be the determining factors as to the student’s level of Latin Honors.

In general, students graduating with Latin Honors must complete the following. These requirements are reduced for students entering the University Honors Program after their freshman year.

- UHP [NEXUS ONE](#) experience
- 3 Honors courses (at least one an HSem or GCC)
- 5 additional Honors experiences (course or non-course)
- Senior thesis and supporting thesis course work (one semester of thesis coursework, minimum; thesis coursework amounting to at least 2 credits after the first semester of thesis coursework may count as one of the three Honors courses, above)
The detailed requirements may be found at Honors Experience Requirements.

Students work closely with their UHP and CEGE Honor’s Program Faculty Adviser, Prof. Barnes, to plan for the right combination of research, coursework and community engagement.

4. Honors Experiences
UHP recognizes that students are actively engaged inside and outside of the classroom throughout their academic career. The UHP Honors Experience was created to encourage this diversity in educational means and to provide students with flexibility when it comes to choosing an individualized educational path.

Careful attention has been paid to the manner in which Honors Experiences can be fulfilled, as to ensure their substantive educational value while maintaining relevance and ease of integration into the student's major requirements.

Courses
Honors departmental courses and honors seminars make up the vast majority of courses that fulfill Honors Experiences. However, freshmen seminars and Writ 1401 also serve as honors course options. In exceptional circumstances, at the suggestion of an honors adviser, students may contract with a faculty member to enhance a non-honors course in order to gain an Honors Experience.

Non-classroom-based options
Participation in various distinctive, educational experiences may be counted as Honors Experiences. Students looking to fulfill their honors experiences in this way must complete an Honors Experience Proposal form. Students should discuss this with their honors adviser prior to completing the proposal.

Examples of non-course options include:
- Undergraduate Research Opportunities Program (UROP) projects and other faculty-directed research*
- Learning abroad experiences*
- Creative expression projects*
- Internships*
- Community involvement projects and volunteering*
- Honors NEXUS Experiences*
- Language Study beyond degree requirement (This applies only to students who began UHP prior to Fall 2018, Students beginning Fall 2018 or later should consult the Current Honors Requirements.)*
- Tutoring (including Justice Page Middle School program) (For students starting Fall 2018 or later, CCEL Module is required to earn an Honors Experience)*

* In order to be approved, these experiences must exhibit significant levels of participation.

5. Honors Thesis
An Honors Thesis project is required for graduation with Latin honors at all levels. This project is the culmination of the student's work in research, creative expression, or practicum experience.
The thesis project must be completed under the direction of a CEGE faculty member and approved by the CEGE Honor’s Program Faculty Adviser, Prof. Barnes.
VII. Intern and Cooperative Education (Co-op) Programs

1. Intern vs. Co-op
Although the Intern and Co-op programs are commonly referred to in the same breath, they are two different programs.

The Intern program is a non-credit program giving students relevant work experience in an engineering setting with the goal of improving students’ educational experiences while strengthening the department’s ties to the professional engineering community. The types and responsibility levels for internships vary greatly.

The Co-op program is a full-time 6-month work assignment where credit is earned, which requires the student to register for a course (CEGE 4190). It is expected that through this full-time work, the student will have an in-depth experience with their employment. At the end of their work assignment the student must write a report and submit it for approval. The Co-op program is open to juniors and seniors majoring in civil, environmental or geo-engineering at the University of Minnesota who have completed at least one semester in the College of Science and Engineering.

For both the Intern and Co-op programs, it is the responsibility of the student to make contact with their prospective employers. The Department of Civil, Environmental, and Geo-Engineering facilitates this by seeking out employment opportunities for internships and co-op work experiences. Check the department website (http://www.cege.umn.edu/current/undergraduate/co-op.html and http://www.cege.umn.edu/current/undergraduate/internships.html) to find job listing. Students are expected to review the listings, contact prospective employers, and arrange for interviews on their own. Students are asked to notify the Student Programs Coordinator (cegesps@umn.edu) when they have accepted a position so the website can be kept up to date.

2. Intern Program
Qualifications
A student’s opportunity to be selected for an intern assignment is largely determined by the qualifications presented in their resume and the image projected in their interview. Students are encouraged to visit the CSE Career Center in 105 Lind Hall, to talk to counselors on preparing their resumes and cover letters, interviewing and searching for a job.

Experience has shown that most prospective employers want to hire students who have completed basic civil engineering courses in surveying (CEGE 3202), soil mechanics (CEGE 3301), and civil engineering materials (CEGE 3402W), but more advanced coursework is sometimes expected (e.g., CEGE 4401 for structural engineering internships). If a student does not yet meet these qualifications, other opportunities for employment may be available on or off campus. Any such notifications of other employment that the department receives are emailed out to CEGE undergraduates and posted on the current undergraduate student webpage.

For those students who are early in their degree program and have limited knowledge that prevents them from opportunities to work in design offices, field experiences provide invaluable opportunities. Students are able to see how test samples are obtained, learn how things are put together, and understand practical constructability constraints that will benefit their future understanding in the classroom and in their later careers in design offices.
3. Co-op Program

Qualifications
The Department of Civil, Environmental, and Geo-Engineering Co-op Program is open to juniors and seniors majoring in civil engineering, environmental engineering, and geoengeering at the University of Minnesota who have completed at least one semester in the College of Science and Engineering; have cumulative grade point average of 2.0 or higher; are a U.S. citizen or permanent resident, or can furnish proof of work authorization to a prospective employer. International students need to complete Curricular Practical Training (CPT) to be authorized to work in the US. Similar to the qualifications for internships, a student’s opportunity to be selected for a co-op assignment is based on their resume and the image they project in their interview, as well as, completion of basic civil engineering courses.

A student is not officially enrolled in the co-op program until they have registered for the course CEGE 4190, which satisfies a technical elective requirement. Approval to register for CEGE 4190 is contingent upon review and approval of a co-op prospectus prepared by the student (form provided in Appendix B), which is a brief statement about the nature of the proposed work assignment.

The normal co-op period is six months. A special two-credit version of CEGE 4190 is available for students who work for shorter periods, but only in cases for which registration in a course is a condition of employment. A special six-credit version of the course is also available for students whose insurance or loan programs require them to take at least six credits to maintain their student status. At most, four credits from CEGE 4190 may be used toward a student’s BCE, BEnvE or BGeoE degree requirements. Students enrolled in the Co-op Program are not eligible to receive department scholarship awards during the semester of their co-op experience because they do not have full-time student status, 13 credits.

Following completion of their work assignment at a location determined by their employer, the co-op student submits a formal report on their co-op experience to the Department of Civil, Environmental, and Geo-Engineering. Following completion of their co-op assignment, the student must return to structured classroom study at the University. Up to 4 cr of CEGE 4190 can be applied toward technical elective requirements.

Benefits of the Co-op Program
Co-op students are directly involved in various engineering professional activities, working as one of the team. Co-op students become familiar with the professional environment in which they will spend their future years. This productive time challenges and motivates students to complete their education, as well as helps the students discover the wide variety of job opportunities available in civil, environmental, and geo-engineering. Co-op students benefit from this work experience and learn practical aspects of engineering, which cannot be learned in a classroom setting.

Description of Qualifying Co-op Work Opportunities
There are a number of different organizations that offer co-op work opportunities including consulting firms and government agencies. A summary of some of the different areas of emphasis and types of work experiences that may qualify for co-op experience follows.

- **Surveying** – Co-op experiences may involve on-site surveying and evaluation of data required for design of roads, highways, bridges, water and sewer systems, or buildings.
- **Soils and Materials Exploration and Testing** – A co-op assignment may include work in a testing laboratory as well as work in the field, taking soil samples from construction sites and...
obtaining specimens of materials being used in actual construction.

- **Construction** – The co-op student may serve as an assistant to the construction manager or construction superintendent, or may serve as a construction inspector for projects in which they become involved. The experience may include becoming acquainted with reading and interpreting construction documents, building code requirements, and specifications. In addition, the co-op student may become familiar with various construction methods.

- **Municipal Engineering** – Co-op experiences in municipal engineering may include surveying, planning, design and construction of water mains, storm and sanitary sewers, water towers, and roads, as well as other projects. Co-op assignments may be in a planning office engaged in urban development or transportation planning.

- **Consulting** – The co-op student may serve as an assistant to a consulting engineer or designer in the important initial stages of project development or design.

**Report Requirements**
The formal report required for satisfactory completion of CEGE 4190 is due in the Civil, Environmental, and Geo- Engineering department office (122 CivE) before 4:30 p.m. on the due date as follows:

- **Spring/Summer Co-op Period**: September 15
- **Summer/Fall Co-op Period**: January 15

The report should include a cover letter addressed to Professor Labuz at the department address:

Professor Joseph Labuz  
Department of Civil, Environmental, and Geo- Engineering  
University of Minnesota  
500 Pillsbury Drive SE  
Minneapolis, MN 55455-0116  
Email: labuz@umn.edu

The body of the report must be no longer than four pages, double-spaced; attachments may be provided, but are not required (see below).

In preparing the report, careful attention should be paid to the presentation and style of writing. Students will be required to correct and resubmit their report if it is not prepared to an acceptable standard. The following reference should be consulted for writing style:


This book is available at most bookstores.

The following items should be covered in the report, at a minimum:

**Background**
- Specifics about the co-op (e.g., employer; start and end dates; position held; how position was obtained)
- Nature of job and typical duties performed
- Amount of training and level of supervision provided by employer
Narrative
- University courses most beneficial to co-op work and why
- List two or three of the most important things learned during co-op assignment, and why they were important
- Discuss how co-op experience affected plans for remaining study, as well as career plans as a civil, environmental, or geo-engineer, depending on your degree program.

Conclusion
- Summarize co-op experience in no more than 50 words.

Attachments (optional)
- A sample of work product (e.g., plans, drawings, reports) prepared substantially by you or under your direction.

For questions regarding the Intern or Co-op Programs, please contact Professor Joseph Labuz. jlabuz@umn.edu

4. Instructions for Intern and Co-op Students Applying for Jobs

1. It is highly recommended that you visit the CSE Career Center in 105 Lind Hall, and talk to the counselors on preparing resumes and cover letters, interviewing, and searching for a job.

2. Check the department website on internships and co-ops. New job opportunities come in mostly during the beginning of spring semester and sporadically after that. The job opportunities are communicated to students by department emails and via departmental website postings on internships and co-ops. The American Society of Civil Engineers (ASCE) Student Chapter hosts a career fair in fall semester, where representatives from 30-40 companies seek to hire interns, co-op students, and graduating seniors.

3. If you see a job that interests you, check the information from the employer on:
   - Type of employment
   - Location
   - Dates and hours of employment
   - Need for providing your own transportation

4. Unless the application instructions are clear from the employer’s forms or information, telephone the employer contact person as soon as possible. He or she will tell you how to proceed with submitting your application and arranging for an interview.

5. If you decide later not to pursue the job, let the employer contact person know in time for him or her to schedule interviews with other students. To just drop out without telling anyone creates a bad impression of you and the department, and also hurts the chances for other students to get jobs.
6. Preview information about the company by visiting their website prior to the interview.

7. Show up for your interview on time.

8. If you take a job, notify the Student Programs Coordinator (cegesps@umn.edu) so that employment opportunity records can be kept up to date. This step is important so that other students do not pursue false leads, and so that your new employer will not be contacted unnecessarily.

9. If your job is for a 6-month period and you want to enroll in the CEGE Co-op Program, fill out the co-op prospectus form found in Appendix B. Upon approval of your co-op opportunity by Professor Labuz, you will be permitted to enroll in the 4-credit course CEGE 4190. Remember that you are not officially a co-op student until you register for this course!

10. If you have any questions, please contact the Student Programs Coordinator (cegesps@umn.edu).

5. Curricular Practical Training (CPT) for International Students

Curricular Practical Training (CPT) is work authorization which allows a student to work in a job directly related to the student’s major area of study before degree completion. CPT authorization is granted by International Student and Scholarship Services (ISSS).

To apply for CPT, you must:

1. Complete a CPT workshop to learn about the application process. Watch the CPT Online Workshop
   – Logging in to Moodle is required for the Online Workshop
   – Enrollment key: isscept
2. Download the CPT Application Packet or obtain the packet from ISSS.
3. Complete the “CPT Student Request and Academic Adviser Verification” form from the packet.
   – Your academic adviser must sign the back of the form. The academic adviser for CPT is the Department Head in Civil Engineering, Professor Joseph Labuz – jlabuz@umn.edu
   – Students must enroll in the CEGE 3190 course for one S/N credit. The course instructor for CEGE 3190 is Prof. Joseph Labuz.
   – To receive the “S” grade to fulfill the requirements of this course, your employer will need to provide Prof. Labuz with an e-mail or letter at the end of the authorized period of employment for the CPT indicating the actual dates of employment and that you performed your work satisfactorily.
   – If you want to extend your CPT authorization with the current employer(s) for less than one month, you must submit authorization from the Course Instructor. Extensions of more than one month of CPT require a new application and, for elective CPT, either a new CPT course registration or the addition of at least one credit to the current CPT course. Additional documentation may be required. Please see the instructions in the application packet.
4. Bring completed application materials to ISSS during walk-in hours or to scheduled appointment to meet with an F-1 adviser for processing.
6. Research Opportunities Program (IOP)
The Department of Civil, Environmental, and Geo-Engineering (CEGE) provides an internship opportunity for upper division students during the academic year. This is a program in which the department locates part-time employment opportunities for undergraduate students working with a faculty member on a research project. IOP is a noncredit program, and it is designed to give students research experience.

The program involves a paid assignment over a 12-14 week period at a level of $12-14 per hour for 120-140 hours during the fall or spring semester. It is well documented that a research opportunity, with a faculty member, enhances the educational experience for the undergraduate student and improves the likelihood of success upon graduation. Nevertheless, the number one priority of a student should be the academic program, so it is suggested that employment be limited to less than ten hours per week. A description of the research path, follows.

The IOP research path builds upon the University Research Opportunities Program (UROP) in supporting undergraduate research projects for qualified students. All faculty in CEGE are actively engaged in discovery of knowledge, and the department will provide support for recommended projects not funded through UROP. The same application packet is used, with submission of proposals typically due the first week of each semester. You can get the proposal form from the faculty adviser who you will be doing research with.

Appendix D will tell you how to successfully look for research opportunities.
VIII. Employment Opportunities for Graduating Students

1. Department of Civil, Environmental, and Geo-Engineering Resources
The department receives information on permanent job opportunities for civil, environmental, and geo-engineering graduates, which are then emailed to the students. The American Society of Civil Engineers (ASCE) Minnesota Student Chapter hosts a career fair typically fall semester, where they invite a number of company representatives to the department interested in hiring our students. Typical attendance has been 30-40 companies.

2. Center for Transportation Studies (CTS) Resources
The University of Minnesota Center for Transportation Studies presents an annual Career Expo early spring semester. The objective of the event is to facilitate connections between students and prospective employers in transportation-related fields. Attendees include representatives from planning, supply chain management, logistics, marketing, and engineering.

3. CSE Career Center
Students are encouraged to become familiar with the career center and its functions. A wide variety of employers representing local, state, and national organizations visit each year. The office schedules interviews and maintains a library with information on prospective employers. The career center is located in 105 Lind Hall; phone 612-624-4090. In addition the college hosts career fairs typically early each Fall and Spring semesters with employers seeking interns and graduates from all CSE-related disciplines.
IX. Scholarships and Awards

1. Scholarships
The Department of Civil, Environmental, and Geo- Engineering awards a significant number of scholarships totaling more than $150,000. While many of these awards are based on academic achievement, many are based on a student’s participation in university and community activities and their potential for pursuing a successful career as a practicing engineer after graduation.

Even though these scholarships are normally awarded to upper division students who have declared a departmental major, lower division students who have a demonstrated interest in civil, environmental, or geo- engineering can apply. The application deadline for scholarships administered by the department is at the beginning of Spring Semester for awards for the following academic year. All scholarship recipients must be enrolled full-time (i.e., at least 13 credits). Students who are enrolled in the Co-op Program are not eligible for scholarships during the semester of their co-op experience because they are not enrolled full-time. Information on the departmental scholarships and external scholarships for which CEGE students are eligible may be found here. Please note that the external scholarship deadlines are scheduled throughout the academic year.

2. Awards
The Department of Civil, Environmental, and Geo- Engineering has the following student awards:

• *The Simon and Claire Benson Award* - the department annually presents this award to undergraduate students who show outstanding performance. Faculty nominates undergraduate students. A cash prize is also included with this award.

• *Chester D. Okerlund Award* - This award is annually presented to the student with the highest grade point average in the Department of Civil, Environmental, and Geo- Engineering graduating class. A cash award is also included with this award.

• *ASCE* - The Minnesota Section of ASCE holds an annual spring banquet to recognize scholarship recipients and to present student awards. ASCE sponsors the Archie & Marie Carter Scholarship that is awarded to a civil engineering student who is an active member of the student chapter, strong academically, and a Minnesota resident. ASCE also presents the ASCE Student Activity Award, the ASCE Outstanding Student Award, and the ASCE SEI scholarship for structures students.
X. Civil, Environmental, and Geo-Engineering Societies and Student Activities

1. Professional Societies

American Society of Civil Engineers (ASCE)
ASCE Faculty Adviser and Steel Bridge Adviser: Professor Jialiang Le
Concrete Canoe Adviser: Professor Henryk Stolarski
Contact: asce@umn.edu

ASCE is the oldest professional engineering organization in the country. ASCE promotes leadership, community service, and networking for all of its members. The officers of the ASCE Student Chapter accomplish this through seminars, luncheons, socials, and a career fair. The ASCE Student Chapter is involved in many projects; two of the most popular are the Concrete Canoe Competition and the AISC Steel Bridge Competition. In the Concrete Canoe Competition, team members design, manufacture, and test super-lightweight concretes that are state of the art. These new materials have excellent potential to be used in all types of projects including buildings, dams, marinas, and other moisture sensitive areas. For the AISC Steel Bridge Competition, the team designs, creates, and assembles a bridge to compete in regional and national competitions. The design process starts in the fall when the team receives the specifications for the event. Construction starts in winter and the competition is usually held in mid-February. At the competition, the bridge is graded on how quickly it can be assembled, the total weight, and the deflection under loading. ASCE offers its members many opportunities. The Department of Civil, Environmental, and Geo-Engineering encourages students to join this organization on the local, state and national levels. For more information visit the student chapter website.

American Public Works Association (APWA)
Contact: apwa@umn.edu

Public works or municipal engineering includes transportation engineering, road design, bridge design, stormwater engineering, water/wastewater treatment and distribution, and urban planning. The APWA student group provides information about careers within public works; facilitates scholarships, internships, and jobs; and offers career building events, networking opportunities, speakers, and technical tours.

Earthquake Engineering Research Institute (EERI)
Faculty Adviser: Professor Cathy French
Contact: eeri@umn.edu

EERI is devoted to reducing earthquake risk by advancing the science and practice of earthquake engineering. The UMN student chapter sponsors speakers and events related to earthquake engineering. There is an opportunity for undergraduate students to become involved in a timber structure competition that is hosted each year in conjunction with the national EERI conference.

Society for Mining, Metallurgy, and Exploration (SME)
Faculty Adviser: Professor Randal Barnes
Contact: umnsme@gmail.com

The Society for Mining, Metallurgy, and Exploration is the world’s largest society of minerals professionals. SME advances the worldwide mining and minerals community through information exchange and professional development. SME is a professional society that promotes interest within the university in mining, metallurgy, and exploration. The student chapter activities include monthly guest speaker meetings, local field trips (nearby mine sites), and social events. Students are also encouraged to become involved with the local professional technical community, which provides tremendous
opportunities for networking. Goals of the Minnesota Section of SME include promoting and developing future careers in the industry through scholarships, internships, and involvement with educational institutions. The website for the student organization is https://www.sites.google.com/site/umnsme/ and the website for the Minnesota Section of SME is http://www.smetwincities.org/.

2. Honor Societies
Chi Epsilon
Faculty Adviser: Professor Lauren Linderman
Contact: chiep@umn.edu
Chi Epsilon is the National Civil Engineering Honor Society, and it seeks to promote the values of Scholarship, Character, Practicality, and Sociability in its members and the profession of civil engineering. To be invited to join, civil engineers must have at least junior standing, and be ranked in the top third of their class academically. The Minnesota Chapter of Chi Epsilon was chartered in 1923 as the third chapter. Today, Chi Epsilon consists of over 120 chapters.

The objectives of the Minnesota Chapter are to maintain and promote the status of civil engineering as an ideal profession, to bestow honor upon civil engineering juniors, seniors and graduate students who have demonstrated exceptional scholarship, and to develop the qualities of character, practicality and sociability in each member of the chapter. In order to carry out these objectives, the Chapter has organized and participated in a number of different activities including fundraising for STEM projects and K-12 STEM outreach.

Tau Beta Pi
Faculty Adviser: Professor Cathy French
Contact: tbetapi@umn.edu
Tau Beta Pi is the only engineering honor society representing the entire engineering profession. It is the nation's second-oldest honor society, founded at Lehigh University in 1885 to mark in a fitting manner those who have conferred honor upon their Alma Mater by distinguished scholarship and exemplary character as students in engineering, or by their attainments as alumni in the field of engineering, and to foster a spirit of liberal culture in engineering colleges. There are now collegiate chapters at more than 240 US colleges and universities, 39 active alumni chapters in 16 districts across the country, and a total initiated membership of over 554,000.

The MN Alpha chapter, founded on June 9th, 1909, is the 22nd chapter in the organization. The group holds a variety of events for both the student body as a whole, and exclusively for members. Events include the Pi Mile Run during CSE week, which is a fundraiser 5k that gets strong attendance. Another popular event for our members is the Professor Luncheon. At this event, members invite their professors to a meal where they can chat and share ideas. It is a great way to start a relationship with a professor that may garner research opportunities. Information sessions are held with companies seeking students of high standing.

Induction into TBP is by invitation only. The top 5% of Seniors and top 3% of Juniors from Engineering majors (including Computer Science) are invited to join. Once inducted, individuals are life members. Dues are only collected once. If you have questions about any of the requirements, send an e-mail to tbetapi@umn.edu.

3. Other Student Societies and Organizations
Order of the Engineer
Faculty Adviser: Professor Joseph Labuz
Contact: jlabuz@umn.edu
The Order of the Engineer initiated at Cleveland State University on June 4, 1970 and has spread nationwide. The goal of the Order is the same as that of the Canadian “Ritual of the Calling of an
Engineer,” acceptance of the Obligation of an Engineer: the development of pride in the profession of engineering and the upholding of the standards and dignity of the profession.

This oath is recognized by the engineer wearing of a steel band around the fifth finger of the working hand. Graduating seniors are initiated in the Order of the Engineer as part of the department graduation ceremony. Ring sizing will take place in your capstone design course CEGE 4102W or CEGE 4104W.

Engineers Without Borders (EWB)
Faculty Adviser: Paul Capel
Contact: ewb@umn.edu
EWB gives students an opportunity to work with communities around the world to find low-cost sustainable engineering solutions to community needs. The mission of Engineers Without Borders University of Minnesota Chapter (EWB-UMN) is to partner with disadvantaged communities around the world and to improve their quality of life through implementation of engineered projects that prove environmentally and economically sustainable.

Innovative Engineers
Faculty Adviser: Paul Imbertson
Contact: i-e@umn.edu
Through the use of innovative technology solutions, Innovative Engineers strives to extend the reach of renewable energy to the developing world by providing communities with the technology and know-how necessary to create and maintain a sustainable energy infrastructure using locally available materials. An example is the construction of a small-scale wind turbine.

Interdisciplinary Transportation Student Organization (ITSO)
Faculty Adviser: Professor Alireza Khani
Contact: itso@umn.edu
ITSO brings together students and transportation professionals across disciplines. Created in 2003, ITSO strives to help coordinate and engage students of different academic disciplines commonly studying issues related to transportation. These fields include civil and industrial engineering, supply chain management, urban and regional planning, and urban design. ITSO is proud to represent the University of Minnesota student body at a variety of professional and academic conferences, and serve not only as an interdisciplinary link, but to help build relationships with practicing professionals and alumni.

Minnesota Environmental Engineers, Scientists, and Enthusiasts (MEESE)
Faculty Adviser: Professor Timothy LaPara and Erin Surdo
MEESE brings together students who are passionate about the environment. MEESE encourages exploration of the environmental engineering field through monthly meetings where interested undergraduate and graduate students can connect and interact. Guest speakers from local engineering firms or government organizations often present and discuss their work at the meetings. Semi-formal networking events with local firms and special technical tours (e.g., a water treatment plant) are scheduled periodically. Volunteering opportunities like river cleanups and judging middle school science fairs are available. MEESE also promotes design challenges for its members to get involved with and compete against other groups on the national level. Contact adviser Tim Lapara for details.
oSTEM @ Minnesota
Contact: ostem@umn.edu

oSTEM @ Minnesota is the University of Minnesota chapter of Out in Science, Technology, Engineering, and Mathematics. Students of all areas of study and identities may join. The mission is to foster community and visibility for LGBTQIA+ students, faculty, staff, and professionals at the University of Minnesota; to create a community of support at the University; to identify, address, and advocate for the needs of LGBTQIA+ students in the STEM fields; and to educate, empower, and provide professional development for LGBTQIA+ students in the STEM fields.
XI. Health, Wellness, and Other Resources

1. **Aurora Center**
The Aurora Center provides a safe and confidential space for students, faculty, staff, alumni, and family members or friends affiliated with the University of Minnesota, TC or Augsburg College who are victims/survivors/concerned people of sexual assault, relationship violence, or stalking.

2. **Disability Services**
The University of Minnesota has a number of resources available for its diverse student population. One of these resources is the Disability Resource Center, which serves students who may have either temporary or permanent disabilities. Services include note taking assistance, document conversion, extra examination time or special room arrangements. Students may be tested to determine if they are eligible. Questions regarding these programs should be directed to the disability specialists. The Disability Resource Center is located at 180 McNamara Alumni Center.

3. **English as a Second Language Resource**
The University of Minnesota provides a number of resources for international students including those who may be non-native English speakers. Types of support include language, writing, and academic skills.

4. **Mental Health Services**
Painful feelings such as anxiety, anger, depression, low self-esteem, and tension are a normal part of being human and can affect anyone. Sometimes these feelings are temporary and can be eased by rest, relaxation, exercise, good nutrition, and support of trusted friends. At other times, stressors, relationships, or past family experiences cannot be managed so easily and become overwhelming. When this happens, and you find it hard to function, you may want to seek professional help.

   Boynton’s mental health staff of psychiatrists, licensed psychologists, and licensed independent clinical social workers provides a variety of counseling options which can be found here. Call the direct line for the Urgent Mental Health Consultation at 612-625-8475. If the counselor is available, the phone will be answered directly. If the counselor is busy or seeing another student, please leave a message. The line is confidential. For emergencies, call 9-1-1.

   There are also services available through Student Counseling Services (340 Appleby Hall). Some of those services include mental health and life concerns, career uncertainty, learning and academic skills challenges, and faculty/staff-student communications.

   Professor Barnes and Professor French are Mental Health Advocates for the CEGE department.

5. **Medical Services**
Boynton’s East Bank Clinic is one of the most comprehensive postsecondary health services in the nation. With a staff of over 200, the East Bank Clinic houses several individual clinics including Dental, Eye, Massage Therapy, Mental Health, Nutrition, Physical Therapy, Primary Care, Women’s Health, Travel Immunization, and Urgent Care. The East Bank Clinic is also home to a full-service Pharmacy and offers health and wellness services.

   Boynton’s East Bank Clinic staff includes licensed and certified physicians, physician assistants, nurse practitioners, registered nurses, licensed practical nurses, certified medical assistants, optometrists, dentists, dental hygienists, mental health care providers (including psychiatrists, psychologists, and social workers), physical and massage therapists, registered dietitians, and pharmacists. For more information refer to https://boynton.umn.edu/. For emergencies, call 9-1-1.
6. **PAWS (Pet Away Worry and Stress)**
Weekly PAWS sessions feature registered therapy animal teams—including dogs, bunnies, chickens, and other therapy animals like cats, horses, Guinea pigs and fancy rats—that you are welcome to interact with and pet. Sessions are FREE and open to the public. Pet Away Worry & Stress on Wednesdays at Boynton Health’s East Bank Clinic and select Tuesdays in the St. Paul Student Center, and Thursdays on the West Bank at various locations.

**East Bank:** Boynton Health, Room W-120, Wednesdays, 2:30–4:30 p.m.
**West Bank:** Locations vary, Thursdays, 11:30 a.m.–1:30 p.m.
**St. Paul:** Student Center, Harvest Room, 2nd & 4th Tuesdays, 1–3 p.m.

7. **Student Counseling Services**
Student Counseling Services (SCS) promotes student success through individual and group counseling; classes, workshops, and presentations; and consultation. Services address a wide range of issues impacting student success, including mental health and life concerns, learning and academic skills challenges, faculty/staff-student communication, and career uncertainty. SCS is located on the east bank campus (340 Appleby Hall) and on the St. Paul Campus. (199 Coffey Hall)

8. **Student Conflict Resolution Center**
The Student Conflict Resolution Center works with students to resolve university-based problems and concerns. The services are free and confidential. SCRC will assist you with any University issue. An ombudsman provides confidential, neutral and informal options. An advocate is available to assist students in formal grievance or disciplinary proceedings. Below list of some of the most common areas of concerns we hear from students. Also check out our DIY Resources for common University-based problems. SCRC is located on the east bank campus (254 Appleby Hall) and at sos@umn.edu.

Ombuds can help students with:
Grading and instructional complaints
Financial and billing conflicts
Academic appeals
Housing issues
Scholastic misconduct (at the informal stage)
Other campus-based concerns

SCRC can help students in the following ways:
Identifying resources
Finding answers to specific questions
Exploring options
Mediating disputes

SCRC also have Advocates on staff who provide fair representation to students who are involved in a formal grievance or disciplinary hearing, such as a Student Conduct Code or Academic Misconduct violation.

9. **Gender – Inclusive Facilities**
For gender – inclusive restrooms on the Twin Cities campus, please visit the inclusivity button on the Twin Cities Interactive Campus Map. The gender neutral restroom in Civil Engineering Building is located on Floor 3 – Room 331 (adjacent to the elevators).
XI. Emergency and Security Procedures

Please review the following emergency and security procedures. If you have any questions, contact the Department of Civil, Environmental, and Geo-Engineering staff in room 122 CivE or telephone: 612-625-5522.

1. Emergency Numbers

<table>
<thead>
<tr>
<th>Service</th>
<th>Phone Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fire Department</td>
<td>9-1-1</td>
</tr>
<tr>
<td>Police Department</td>
<td>9-1-1</td>
</tr>
<tr>
<td>Ambulance</td>
<td>9-1-1</td>
</tr>
<tr>
<td>Chemical spills (emergency)</td>
<td>9-1-1</td>
</tr>
<tr>
<td>Chemical spills (for prompt response, non-emergency ask to consult with DEHS staff on call)</td>
<td>9-1-1</td>
</tr>
<tr>
<td>Department of Environmental Health &amp; Safety: Consult with DEHS staff on call</td>
<td>612-626-6002</td>
</tr>
<tr>
<td>Facilities management</td>
<td>612-624-2900</td>
</tr>
<tr>
<td>University Emergency Management</td>
<td>612-625-8047</td>
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</tbody>
</table>

2. Closing Offices

Only the President or one of his designates can close the University. University Relations has the responsibility to notify the campus community and the public if the University is to be closed.

3. Safety/Security

Building Hours
The Civil Engineering Building is open to the public from 7:00 a.m. until 7:00 p.m Monday through Friday. All students enrolled in the Department of Civil, Environmental and Geo-engineering have 24/7 access to the building with their UCard. For laboratory safety and security, authorized personnel are asked to use a buddy system when working in the Civil Engineering Building after hours. Authorized personnel and custodial staff are asked to report unusual incidents or unauthorized people to the University Police.

Emergency Telephones
Special automatic dial security telephones are located in the elevators, hallways on the 6th and 7th floor, and in the refuge areas in the main stairwell and the east stairwell.

Escort Service
The University offers free walking and biking security escorts 365 days a year to and from campus and adjacent neighborhoods. Contact 612-624-WALK (9255) to request a security escort.

4. Threats & Violence

For any threat call 9-1-1 for police assistance if you observe violence taking place or believe/feel there is an immediate threat to someone's safety. All faculty, staff, and student workers should communicate to an administrator/supervisor any knowledge of violence or threat-related behaviors including possession of a weapon in the workplace. Students and other non-workers should call 9-1-1.
5. Emergency Procedures

Contact
University Police (9-1-1 in emergencies, 612-624-2677 in non-emergencies). In case of fire or medical emergency, position someone outside the building to lead ambulance or fire personnel to the emergency location.

Fire Emergencies
Elevators will shut down automatically when there is a fire alarm. All employees should familiarize themselves with fire exits, stairwells and extinguishers located in the building. Evacuate the building immediately when a fire alarm is sounded and do not return until the fire department has approved re-entry into the building. There are refuge areas located on the 4th floor landing in the main stairwell and the 4th and 5th floor landings in the east stairwell. Report the use of fire extinguishers so they can be inspected and refilled.

Injuries
If an employee is injured on the job, the supervisor is responsible for notifying the department administrator and obtaining a “Report of Incident” form to complete. This form must be completed within 24 hours of the injury. Failure to comply may result in loss of Worker's Compensation Rights and a fine levied against the department.

TXT-U
TXT-U is the University’s emergency notification text messaging system. Students with an active Internet ID and University of Minnesota email address are automatically added to the TXT-U system. However, only those with cell phone numbers included in their University personal information will receive emergency text messages. To be sure you will receive TXT-U messages in an emergency, verify your information by going to https://safe-campus.umn.edu/emergency-notifications.

6. Minnesota Employee Right to Know Act (MERTKA)
All new graduate students and employees of the Department of Civil, Environmental, and Geo-Engineering are required to attend safety-training sessions, follow safety guidelines, and read the “Laboratory Safety Plan” before working in any laboratory.

7. Chemical Spills
Call 9-1-1 (For a chemical spill of any size, it is always acceptable to call 9-1-1.)
- fire or explosion potential—>25% lower explosive limit (LEL)
- conditions immediately dangerous to life and health (IDLH), including low oxygen and a high level exposure to toxic substances
- uncontrolled release of a hazardous substance
- hazardous spill in a public hallway
- spills > 5 gallons

For a chemical spill requiring a prompt response, but is a non-emergency, you can also call 9-1-1 and request a "Consult with DEHS staff on call."

If you call an emergency number, notify the front office as soon as possible and give a brief description of what you reported, 612-625-5522. Also, at your earliest convenience please email Kathy Wabner, DSO, and give a report of the situation (your contact information, what happened, why it happened, where it happened, and how it was resolved).
You are never expected to clean up a chemical spill, if you have not received training, do not have proper equipment, or feel uncomfortable.

Often spills require a prompt response, but do not pose an emergency. For those, contact the Department of Environmental Health and Safety (DEHS) by calling 911, then request “Consult with DEHS on call.” Don't hesitate to call:
- for any amount of mercury or stench chemical,
- spills > 4 L,
- if you don’t feel comfortable, or have the training or supplies needed to clean it up, and need guidance assessing the situation, additional supplies, monitoring equipment or responders.

If you are familiar with the chemical hazards, have received training, have supplies needed to clean up, feel comfortable handling chemicals and would like to perform responsive control measures, you may do so at the time of a spill in the immediate area.

Small chemical spills
- Small chemical spills may be cleaned up by laboratory personnel.
- Spill kit - Each lab should have a spill kit in their laboratory space. It should be accessible and stocked according to the needs of each individual lab and chemicals used within your lab. A spill kit can be ordered through U Market or you may assemble one using supplies ordered through U Market. Please be certain your kit is in a highly visible container and may be easily transported.

Large spills or toxic materials
- Larger spills or spills of especially toxic materials should be cleaned up by professionals.
- Immediately, contact the Department of Environmental Health & Safety at (612) 626-6002.
- After hours or on weekends, call 9-1-1 for assistance.

Mercury spills
- Except for a small bead or two from a broken thermometer, mercury spills should always be cleaned up by the Department of Environmental Health & Safety. Contact at (612) 626-6002.
### Appendix A - CEGE Preapproved and Recommended Technical Electives

<table>
<thead>
<tr>
<th>Courses</th>
<th>Title</th>
<th>Credits</th>
<th>B.CE.</th>
<th>B.EnvE.</th>
<th>B.GeoE.</th>
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<td>CEGE 3401</td>
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<td>PA 4200</td>
<td>Urban and Regional Planning</td>
<td>3</td>
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<td>PA 5013</td>
<td>Law and Urban Land Use</td>
<td>1.5</td>
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<td>PA 5204</td>
<td>Urban Spatial and Social Dynamics</td>
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<td>PA 5231</td>
<td>Transit Planning and Management</td>
<td>3</td>
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<tr>
<td>PA 5723</td>
<td>Water Policy</td>
<td>3</td>
<td>R</td>
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<tr>
<td>STAT 5021</td>
<td>Statistical Analysis</td>
<td>4</td>
<td>R</td>
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<tr>
<td>STAT 5302</td>
<td>Applied Regression Analysis</td>
<td>4</td>
<td>R</td>
<td>R</td>
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<tr>
<td>WRS 5101</td>
<td>Water Policy</td>
<td>3</td>
<td>R</td>
<td>R</td>
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</table>

1For Municipal Engineering emphasis, CEGE 3111, CEGE 3202, and CEGE 4201 are highly recommended. In addition, it is recommended that students take at least one course from four of five categories (Transportation, GIS, Water Resources, Construction Management, or Other (PA 4200, CEGE 5253, WRS 5101, or CEGE 4121).
ME 3331 can be taken in place of the thermodynamics course, CHEM 4501, required for the BEnvE program, but it cannot be taken as a technical elective.

Any course on this list as well as any 4XXX-level course or higher offered in any of the departments in the College of Science and Engineering are considered preapproved technical electives for the BCE degree.

| R | preapproved and recommended for area of emphasis |
| HR | preapproved and highly recommended for area of emphasis |
| Req’d | Required for program |

Req’d* = Students admitted to the program prior to Fall 2017 are not required to take CEGE 3103 – Engineering Ethics and Professional Issues (1.0 cr) and CEGE 4101W – Project Management and Engineering Economics (3.0 cr), although they are highly recommended as technical electives.

ESD = Engineering Science and Design Elective for BEnvE program

ESP = Environmental Science and Policy Elective for BEnvE program

ESD/ESP or HR = Electives can be used for ESD/ESP or HR but not both in the BEnvE program
Appendix B

Department of Civil, Environmental, and Geo- Engineering Co-op Prospectus

Please attach a copy of your resume and current transcript.

Name: _______________________________________________________________
      (Last)   (First)   (Middle Initial)

Address: __________________________________________________________________________________________
          __________________________________________________________________________________________
          __________________________________________________________________________________________
          __________________________________________________________________________________________

Telephone: ______________________________   Email: ______________________________

Employer name and address:

______________________________________________________________________________________________
          __________________________________________________________________________________________
          __________________________________________________________________________________________
          __________________________________________________________________________________________

Period of full-time employment: __________________ to __________________

Hourly salary: __________________

Briefly describe your job duties (add additional page if necessary):

______________________________________________________________________________________________

______________________________________________________________________________________________

(Signature)     (Date)
## Appendix C
### Integrated Bachelor/Masters Course Planning Worksheet – Year 4
**B.C.E/B.Env.E/B.GeoE**

*Upload this form into the online graduate application applyyourself in the supplemental uploads section.*

<table>
<thead>
<tr>
<th>Today’s date</th>
<th>ID Number</th>
<th>GPA</th>
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<tr>
<th>Name (Last, First, MI)</th>
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<table>
<thead>
<tr>
<th>Email Address</th>
<th>Undergraduate Adviser</th>
<th>Graduate Adviser</th>
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<table>
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<tr>
<th>Undergraduate Emphasis Area</th>
<th>Graduate Emphasis Area</th>
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</table>

<table>
<thead>
<tr>
<th>Semester Seeking Admission</th>
<th>Planned Bachelor’s degree graduating semester</th>
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</thead>
</table>

**Instructions:** On this form, please list the courses that will fulfill your Bachelor’s degree tech elective course requirements. Students who are at the end of their junior year are eligible to apply. If you apply a course towards your bachelor’s degree, you can not apply it towards your MS degree. You will still need to approve your technical elective courses from your undergraduate advisor.

### Completed and Planned Technical Elective Program for CE, EnvE, or GeoE

<table>
<thead>
<tr>
<th>Course (e.g. CEGE 4512)</th>
<th>Credits</th>
<th>Semester (i.e. F09)</th>
<th>Course (e.g. CEGE 4512)</th>
<th>Credits</th>
<th>Semester (i.e. F09)</th>
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</table>

### Planned Masters Courses Taken as an Undergraduate Student

<table>
<thead>
<tr>
<th>Course (e.g. CEGE 4512)</th>
<th>Credits</th>
<th>Semester (i.e. F09)</th>
<th>Course (e.g. CEGE 4512)</th>
<th>Credits</th>
<th>Semester (i.e. F09)</th>
</tr>
</thead>
<tbody>
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</table>

**Total Credits (1 minimum and 16 Maximum):_______**
Appendix D

How to Successfully Look for Research Opportunities

1. Do your homework (Part I).
   1.1. Go to the “Office of Undergraduate Research” web page [https://ugresearch.umn.edu/].
   1.2. Spend time reading the web site. Start with all of the items under the “About” tab.
       Continue on to the other tabs.
   1.3. Pay particular attention to the UROP section.
   1.4. Read the entire site. Take notes.

2. Do your homework (Part II).
   2.1. Go to the CEGE Department’s web page [http://www.cege.umn.edu/].
   2.2. Select the “Research” tab.
       2.2.1. Read all of the entries under “Research Areas”.
       2.2.2. Read all of the entries under “Facilities”.
   2.3. Identify which of the research areas are of greatest interest to you.
   2.4. Make a note of 1-4 faculty members who work in your areas of greatest interest.
   2.5. Using the links provided, read the faculty web page for each of the noted faculty
       members.
   2.6. Identify which of the faculty members are of greatest interest to you.
   2.7. Reread the faculty web page for these identified faculty members.
   2.8. Go to the University of Minnesota Libraries web site [https://www.lib.umn.edu/].
       2.8.1. Select the “Web of Science” database.
       2.8.2. Type in the name of one of your identified faculty members in the search field
           using the format “LASTNAME, FIRSTNAME”; for example, “NOVAK, Paige”
           (without quotation marks). Change the “Select from Index” to “Author”.
       2.8.3. Look at the titles and read (at least) the abstracts of a few recent papers by the
           identified faculty member. Take notes. Note the associated coauthors and their
           affiliations.

3. Do your homework (Part III).
   3.1. Find out when your identified faculty members of interest have their office hours.
       3.1.1. Office hours are usually posted on the office doors.
       3.1.2. Also, this way you can make certain that you know where the offices are.
   3.2. If you are unable to meet the faculty member during their office hours, e-mail the faculty
       member to set up an appointment.

4. Update your personal resume.

5. Knock on the doors of your identified faculty members during their office hours or during the
   time you scheduled with them via e-mail.
   5.1. Introduce yourself.
5.2. Tell the faculty member that you are interested in their work.
  5.2.1. Demonstrate this interest by referencing what you have learned from your homework.
  5.2.2. Shamelessly, take out your notes and show your identified faculty members.
Appendix E
5 year plan for a double major in ESCI & GeoE

Freshman Year
Fall Semester (17 cr)
CHEM 1061 – Chemical Prin I (3)
CHEM 1065 – Chem Prin I Lab (1)
CSE 1001 – 1st Year Experience (1)
MATH 1371 or MATH 1271 – Calculus I (4)
MATH 1374 – Multivariable Calculus (4)
Liberal education elective (3)

Spring Semester (16 cr)
CHEM 1062 – Chemical Prin II (3)
CHEM 1066 – Chem Prin II Lab (1)
MATH 1372 or MATH 1272 – Calculus II (4)
Liberal education elective - Biology (4)

Freshman writing requirement (4)

Sophomore Year
Fall Semester (17 cr)
AEM 2011 – Statics (3)
ESCI 2201 – Solid Earth Dynamics I (4)
ESCI 2301 – Mineralogy (3)
MATH 2374 (2263) – Multivariable Calculus (4)
Liberal education elective (3)

Spring Semester (15 cr)
AEM 3031 – Deform Body Mech (3)
ESCI 2202 – Earth History (4)
ESCI 2203 – Earth Surface Dynamics (4)
ESCI 3891 – Field Methods (2)
MATH 2373 (2243) – Lin Alg & Diff Eqns (4)
Liberal education elective (3)

Summer Session after Sophomore year (4 cr)
ESCI 3911 – Intro Field geology (4)

Junior Year
Fall Semester (15 cr)
CEGE 3101 - Computer Applications I (3)
CEGE 3501 – Environmental Eng (3)
ESCI 3303W – Geochem Principles (4)
ESCI 4501 – Structural Geology (3)
Liberal education elective (3)

Spring Semester (17-19 cr)
CEGE 3102 – Uncert. and Design Analysis (3)
CEGE 3301 – Soil Mechanics I (3)
CEGE 3502 – Fluid Mechanics (4)
CEGE 4121 – Computer Apps II (3)
ESCI 5805 – Strand. & Pract. (3)

Summer Session after Junior year (4 cr)
ESCI 4911 – Advances Field Geology or 4971W Hydrogeology

Senior Year
Fall Semester (16-19 cr)
CEGE 4101W – Project Management (3)
CEGE 4311 – Rock Mechanics (4)
Tech. ESCI/CEGE Elective (3-4 cr)*
Liberal education elective (3-4 cr)

Spring Semester (10-13 cr)
CEGE 4104W – Capstone Design (4)
ESCI 4702 – General Hydro (4)
Tech. ESCI/CEGE Elective (3-4 cr)*
Liberal education elective (3-4 cr)

*Of these three courses, at least one must be in CEGE and one in ESCI

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Website: www.esci.umn.edu
Phone: 612-624-1333
Main office: 150 Tate Hall
Director of Undergraduate Studies: Joshua Feinberg
Email: feinberg@umn.edu

CEGE Department Contact Information
Website: www.cege.umn.edu
Phone: 612-625-5828
Main office: 122 CivE
Director of Undergraduate Studies: Randal Barnes
Email: barne003@umn.edu
Equal Opportunity Statement

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This publication is available in alternative formats upon request. Please contact:

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