McCormick

Northwestern Engineering

Civil and Environmental Engineering

Undergraduate Civil and Environmental Engineering Handbook

2012-2013

Name:_____

Campus Address:_____

Phone: _____

E-mail: _____

********** **Important Notice to All Advisees** **********

Please have the following information with you when you meet with your advisor:

- Updated summary of MTS and ET units (Table CE.4 or EE.3)
- Undergraduate curriculum plan (page 40)
- Updated check-off sheet (Table CE.5 or EE.4)

Preface

This handbook is intended to support you as an entering and continuing undergraduate in the Department of Civil and Environmental Engineering (CEE), McCormick School of Engineering and Applied Science (MEAS), at Northwestern University. The degree requirements provided in this handbook are based on the 2012-2013 Northwestern Undergraduate Catalog. Continuing undergraduate students may choose to meet the requirements from prior catalog years. Degree requirements for catalog years since 2010-11 are available online http://www.civil.northwestern.edu/undergraduate/civil_engineering/civil_curriculum.html, or http://www.civil.northwestern.edu/undergraduate/environmental_engineering/environmental_curriculum.html for, respectively, civil engineering and environmental engineering.

This handbook is prepared as a handy reference guide to the requirements, programs, policies, and procedures of the Department, School, and University. We hope that you will find the information you need for both planning and understanding your engineering education.

The Department would also like to emphasize the importance of the social and ethical implications of the engineers' work in the betterment of the society. The CEE Department offers two ABET accredited engineering programs, Bachelor of Science in Civil Engineering (BSCE) and the Bachelor of Science in Environmental Engineering (BSEE). At Northwestern University, you will have the opportunity to experience the diverse cultures from the many ethnic groups among our students, faculty, and students. You will also have an opportunity to explore outside the U.S. through the Study Abroad Program and many student projects around the globe through the various student organizations such as the Engineers for the Sustainable World and the Global Architectural Brigades. We encourage you to seek out and explore courses and activities that will enrich your learning experience during your time at Northwestern.

Although this handbook embraces the development of an undergraduate engineering education, it does not constitute a complete or definitive statement of the policies of Northwestern University and McCormick School of Engineering and Applied Sciences. The Northwestern Undergraduate Catalog 2012-2013 is the official document of the University for defining academic programs and requirements. The final authority for academic degree requirements of BSCE and BSEE is jointly administered by the faculty of the MEAS, McCormick School Curriculum Committee, and the faculty of the CEE Department. Furthermore, the curricula of both the BSCE and BSEE degrees must be in compliance with the ABET accreditation requirements.

We hope you find this handbook a useful resource as you progress through your years at Northwestern. We wish you much success and welcome your suggestions for improvement of the handbook.

Jianmin Qu
Murphy Professor and Chair
Civil and Environmental Engineering

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Responsibility for Meeting Degree Requirements

Ultimately, students are responsible for understanding the degree requirements for their Majors and for planning their courses of study accordingly. The McCormick School Undergraduate Engineering Office serves as an invaluable resource for information and assistance regarding courses, registration, majors, study abroad, your degree progress, and more. Faculty advisors assigned to you will assist in course selection, but they are not responsible for ensuring that the courses selected meet degree requirements. That is the responsibility of the student.

Missions

Northwestern University

Northwestern is committed to excellent teaching, innovative research, and the personal and intellectual growth of its students in a diverse academic community.

McCormick School of Engineering and Applied Science

The mission of the Robert R. McCormick School of Engineering and Applied Science is to achieve excellence at all levels of engineering education, research, and practice. From undergraduate and graduate students to faculty and staff, the McCormick community is engaged in the creation, exploration and application of engineering and scientific principles to the solution of problems and the advancement of society. With a solid grounding on fundamentals and a balance between adaptability and collaboration and analysis and creativity, the McCormick School partners with industry, government, the Northwestern community and peer institutions in pursuit of its mission.

Department of Civil and Environmental Engineering

We empower our students to gain technical, design, and management skills needed for leadership. We emphasize fundamental principles and design methods that apply to many career paths. We conduct research that advances our ability to:

1. *Plan, design, construct, and operate society's infrastructure*
2. *Design and control behavior of materials*
3. *Sustain natural and engineered environmental systems*

We achieve this through basic and applied projects in which students and faculty work together in cutting-edge facilities.

The above mission statements can be found on the websites:
University – http://www.northwestern.edu/provost/
McCormick – http://www.mccormick.northwestern.edu/about/leadership/vision_statement/index.html
Department – http://cee.northwestern.edu/about/mission.html

Academic Advising

Faculty Advising

When entering McCormick School of Engineering and Applied Science (MEAS) as freshmen, they are assigned a faculty advisor among the faculty in McCormick School. During the spring quarter of the freshmen year, the students are assigned a faculty advisor from their program of interest. This faculty member will stay with the student until he/she graduates or changes program.

When entering the civil engineering or environmental engineering program as a transfer, either from the McCormick School, other schools in the Universities, or other universities, the students are assigned a faculty advisor from the student's program area. This faculty advisor will stay with the student until he/she graduates or changes program.

Faculty advisors help students translate their interests into an appropriate course of study, evaluate their curriculum and workload, monitor their progress toward a degree, and take advantage of the diverse opportunities available at Northwestern. Students should consult their faculty advisor when they have questions about the academic requirements of the university, MEAS, and the degree program. Faculty advisors evaluate each quarter's program and progress, approve social science/humanities theme form, and approve petition requests.

Students who wish to petition for an exception to the program requirements should discuss the matter first with their advisor, who must sign any petition before it can be considered. To be effective, a faculty advisor must be aware of a student's academic and personal goals.

Students must consult with their faculty advisors during the preregistration advising period to receive approval of their course selections for the following quarter. Students are responsible for staying in contact with their faculty advisor and ensuring that the advisor is aware of their goals and progress. Academic difficulties may be avoided if the advisor is able to recognize problems early. Students often form strong intellectual bonds with their faculty advisors, and this is more apt to happen if the student takes the initiative. Another benefit of developing a relationship with the faculty advisor (and faculty members in general) is that students may wish to ask the advisor for a letter of recommendation at some point in their career. Such letters are most useful when they come from people who know the student well enough to accurately assess their capabilities.

What to Expect from an Advisor

1. ***Curriculum Advice***. Students should use their advisors as resources for planning their academic program and identifying academic and career goals. The advisor will be able to explain degree program requirements, scheduling/registration procedures, and other academic regulations. A faculty advisor may refer a student to other faculty members or offices that are better able to serve the student's needs.
2. ***Assistance***. Advisors can help students explore special programs, such as cooperative education, study abroad, dual-degree, certificate programs, and double-Major programs. They may also be helpful in obtaining tutorial assistance or transfer/advanced placement credit, as appropriate. Students often ask their advisors to provide letters of recommendation for scholarships, study abroad, employment, or graduate school.

3. ***Career Development***. While it is not the function of advisors to help students find employment, they should be able to give broad advice on careers in engineering and science and the academic background necessary for such careers. Samples for such advices may include:
    a. discuss professional opportunities for BSCE or BSEE graduates and the preparation and course of study needed to meet those positions,
    b. remind the students to start searching for internship,
    c. discuss the importance of summer internship for those who wish to practice upon graduation,
    d. discuss the importance of participating in summer research such as Research Experience for Undergraduates (REU) for those who wish to pursue graduate studies,
    e. discuss the general procedure in searching for post graduate employment and summer internship.
    f. provide information on post-graduate education and general requirements for admission to graduate programs.

    A faculty advisor may refer a student to other faculty members or offices that are better able to serve the student's needs.
4. ***Availability***. Students should expect to have ready access to their advisors. Most advisors set aside several office hours each week and will usually make appointments outside those hours if necessary.
5. ***Personal Contact***. Students should expect to have personal relationships with their advisors, through which the advisors will become familiar with the students' backgrounds, academic records, and career plans.

What Not to Expect from an Advisor

1. ***Assessment of Effort Required for Specific Courses***. Advisors can determine the appropriateness of a given course in a student's program, but they cannot predict how difficult the course will be or how much effort it will require.
2. ***Help with Personal Problems***. Students should make their advisors aware of problems that interfere with academic progress, but advisors are not trained to provide counseling for personal problems, nor should they be expected to resolve housing or financial issues. However, they will refer students to the appropriate university office or program.
3. ***Job Search Assistance***. While students should be able to discuss career options with their advisors, it is not the advisor's responsibility to provide assistance beyond those presented in item 3 of "What to Expect from an Advisor" in a job search. Students should contact University Career Services or the McCormick Office of Career Development for help in finding employment.
4. ***Tutoring/Study Skills***. Advisors are often able to identify the need for tutoring, remedial course work, or improved study skills but should not be expected to provide the necessary assistance. Students in need of such assistance are generally referred to other resources, such as McCormick Tech Tutoring Program.

Student Responsibilities in the Student-Advisor Relationship

1. ***Accept Referrals***. Students should be willing to accept referrals from their advisors and should review the results of such referrals with their advisors after the fact.
2. ***Initiate Contact***. Students are expected to initiate contact with their advisors for scheduling, course changes, and other matters in a timely fashion. Because of teaching commitments, research, and travel obligations, advisors may not be available on short notice. Students are urged to plan ahead and initiate contact with their advisors well in advance of specific deadlines.
3. ***Keep Advisors Informed***. Advisors can provide better advice if they are kept informed of their advisees' academic progress and career goals. Students should feel free to share this information with their advisors and can expect that their advisors will ask questions and provide appropriate guidance based on the dialogue.
4. ***Work to Develop Rapport***. The rapport necessary for good advising can occur only if both advisor and student make an active effort to develop it. Recognizing that individual advisors have their own styles and personalities, students should respond to the efforts of their advisors to get to know them and their academic interests.

Bachelor of Science in Civil Engineering (BSCE)

The Bachelor of Science in Civil Engineering program at Northwestern University is accredited by the Engineering Accreditation Commission of the ABET, Inc. (http://abet.org)

Program Educational Objectives

The Civil Engineering Program Educational Objectives (PEO) are:

A. Graduates employ their knowledge of science, mathematics, and engineering in civil and environmental engineering practice, research, and management as well as other professional fields such as law, medicine, finance, and management.
B. Graduates become leaders in organizations that focus on advanced problem solving for complex systems in multidisciplinary settings.
C. Graduates play key roles in the process of constructing and managing local and global civil and environmental engineering infrastructure systems.
D. Graduates are engaged in broadly conceived organizations that require a diversity of thought, creativity, and curiosity.

Student Learning Outcomes

The student learning outcomes of the BSCE program at Northwestern University are the same as the outcomes (a) through (k) in the ABET accreditation criteria. These outcomes are:

(a) an ability to apply knowledge of mathematics, science, and engineering
(b) an ability to design and conduct experiments, as well as to analyze and interpret data
(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
(d) an ability to function on multidisciplinary teams
(e) an ability to identify, formulate, and solve engineering problems
(f) an understanding of professional and ethical responsibility
(g) an ability to communicate effectively
(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
(i) a recognition of the need for, and an ability to engage in life-long learning
(j) a knowledge of contemporary issues
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

The student learning outcomes support the program educational objectives given above. The relationship of student outcomes to program educational objectives showing how the PEO are attained is given in Table CE.1 and posted on the department web site http://cee.northwestern.edu/undergraduate/civil_engineering/program_objectives.html. In this Table, PEO A, *Graduates employ their knowledge of science, mathematics, and engineering in civil and environmental engineering practice, research, and management as well as other professional fields such as law, medicine, finance, and management*, is attained through outcomes (a), (b), (e) & (k). Similarly, PEO B is attained through outcomes (c), (d), (e), (g), (h), and (k); PEO C is attained through outcomes (d), (f), (g), (h), and (j); and PEO D is attained through outcomes (d), (f), (g), (h), (i), and (j).

Table CE.1 Mapping of BSCE Program Educational Objectives and Student Learning Outcomes

BSCE Program Educational Objectives	BSCE Student Learning Outcomes
A. Graduates employ their knowledge of science, mathematics, and engineering in civil and environmental engineering practice, research, and management as well as other professional fields such as law, medicine, finance and management.	(a) Ability to apply knowledge of mathematics, science, and engineering. (b) Ability to design and conduct experiments, as well as to analyze and interpret data. (e) Ability to identify, formulate, and solve engineering problems. (k) Ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
B. Graduates become leaders in organizations that focus on advanced problem solving for complex systems in multidisciplinary settings.	(c) Ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability. (d) Ability to function on multidisciplinary teams. (e) Ability to identify, formulate, and solve engineering problems (g) Ability to communicate effectively. (h) Broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context. (k) Ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
C. Graduates play key roles in the process of constructing and managing local and global civil and environmental infrastructure systems	(d) Ability to function on multidisciplinary teams. (f) Understanding of professional and ethical responsibility. (g) Ability to communicate effectively. (h) Broad education necessary to understand the impact of engineering solutions in a global, economic, environmental and societal context. (j) Knowledge of contemporary issues.
D. Graduates are engaged in broadly conceived organizations that require a diversity of thought, creativity, and curiosity.	(d) Ability to function on multidisciplinary teams. (f) An understanding of professional and ethical responsibility. (g) Ability to communicate effectively. (h) Broad education necessary to understand the impact of engineering solutions in a global, economic, environmental and societal context. (i) Recognition of the need for, and an ability to engage in lifelong learning. (j) A knowledge of contemporary issues

Program Requirements

The minimum number of units required for the BSCE degree is 48 units. Among them are:

McCormick core course (32 units)

- Mathematics (4 units)
- Engineering Analysis and Computer Proficiency (4 units)
- Design and Communications (3 units)
- Basic Engineering (5 units) Basic Sciences (4 units) – Physics, Chemistry, an d1 unit of other basic science)
- Social Sciences and Humanities (7 units)
- Unrestricted Electives (5 units)

Civil Engineering Major (16 units)

- Civil Engineering Core Courses (7 units)
- Mathematical Techniques and Science (2 units)
- Design and Synthesis (2 units)
- Technical Electives (5 units)

The 48 units of courses must also meet the following criteria

1. A ***minimum of 18 units of "Engineering Topics" (ET) and a minimum of 12 units of "Math/ Science" (MTS) from 48 units are required for the BSCE degree***. Note that NOT every course from every department in McCormick is classified as an engineering topic. Please consult with your advisor and McCormick partition list[1] for ET and MTS partitioning of courses offered by McCormick.
2. The 1 unit of other basic science must be selected such that it is consistent with BSCE Program Educational Objectives.
3. The cumulative GPA of the 16 units of Civil Engineering major courses must be 2.00 or higher.
4. NO P/N option course is permitted among the 16 units of Civil Engineering major courses. GEN_ENG 220-1,2 which has only a P/N optional is exempted from this requirement. Courses taken abroad for a grade, but recorded by the Northwestern University Registrar as P/N, may be exempted from this requirement.
5. A maximum of two (2) courses among the 16 Civil Engineering major courses may have a grade of D.
6. The only courses in the BSCE degree requirements that are eligible for P/N option are the seven (7) social science/humanities and five (5) unrestricted elective courses. Only four (4) 100- or 200-level courses may be taken P/N to satisfy the 7-unit requirement in the social science/humanities. Courses taken abroad for a grade, but recorded by the Northwestern University Registrar as P/N, may be exempted from this requirement.
7. A maximum of eight (8) P/N option units are permitted among 48 units required in satisfying the graduation requirement.
8. Only 1 unit per quarter may be taken P/N during freshman and sophomore years.
9. A GPA of NO less than 2.0 is required for all units presented for the BSCE degree.

[1] McCormick partition list is available on the web, http://www.mccormick.northwestern.edu/undergraduates/bachelors-degree-curriculum/abet-outcomes/abet-course-partitioning.php

Detailed Program Requirements

A. **McCormick School Core Courses (32 Units)**

The McCormick School (MEAS) Core Courses has 7 subgroups: *Basic Sciences* (4 units), *Engineering Analysis* (4 units), *Mathematics and Sciences* (4 units), *Design and Communications* (3 units), *Basic Engineering* (5 units), *Social Sciences/Humanities* (7 units), and *unrestricted electives* (5 units). This group of courses is largely "menu-driven" in that options are provided to permit different engineering disciplines to select specific courses in several of these categories (and further sub-categories) from a fixed set of courses so as to focus on the needs of the particular discipline. If the discipline elects not to specify courses to be taken for that discipline, the student is free to choose from the list of courses offered for each sub-group. These options apply mainly to the sub-groups of Basic Sciences, Basic Engineering, and to a limited extent, the communications portion of Design and Communications (1 elective course). Considerable latitude is afforded in the selection of courses in the Social Science/Humanities sub-group. Unrestricted electives permit a student to take any course offered for credit by the University (so long as applicable pre-requisites are satisfied).

1. *Basic Sciences (4 units)*

   All civil engineering undergraduates are required to take
   - i. CHEM 101 – General Chemistry
   - ii. CHEM 102 – General Inorganic Chemistry
   - iii. PHYSICS 135-2 – General Physics 2
   - iv. choose one course from Biological Sciences or Earth and Planetary Sciences
     - a. BIOL_SCI 215 – Genetics and Molecular Biology
     - b. CIOL_SCI 216 – Cell Biology
     - c. BIOL_SCI 217 – Physiology
     - d. EARTH 201 – Earth Systems Revealed
     - e. EARTH 202 – Earth's Interior

2. *Engineering Analysis (4 units)*
   - i. GEN_ENG 205-1 – Engineering Analysis I (introduction to linear algebra and Matlab)
   - ii. GEN_ENG 205-2 – Engineering Analysis II (introduction to vector mechanics, statics, dynamics, mechanics of materials)
   - iii. GEN_ENG 205-3 – Engineering Analysis III (dynamics behavior of the elements)
   - iv. GEN_ENG 205-4 – Engineering Analysis IV (solution methods for ordinary differential equations)

3. *Mathematics (4 units)*
   - i. MATH 220 – Differential Calculus of One-Variable Functions
   - ii. MATH 224 – Integral Calculus of One-Variable Functions
   - iii. MATH 230 – Differential Calculus of Multivariable Functions
   - iv. MATH 234 – Multiple Integration and Vector Calculus

4. *Design and Communications (3 units)*
   - i. DSGN 106-1,2 (0.5 unit each) – Engineering Design and Communication
   - ii. ENG 106-1,2 (0.5 unit each) – Writing in Special Contexts, must be taken concurrently with DSGN 106-1,2.
   - iii. choose one from:

a. GEN_CMN 102 – Public Speaking
b. GEN_CMN 103 – Analysis and Performance of Literature

5. *Basic Engineering (5 units)*

Civil Engineering students are required to take 5 basic engineering courses from four different areas. These courses are:

i. *Electrical Science* – choose one from below
   a. MECH_ENG 233 – Electronics Design
   b. EECS 202 – Introduction to Electrical Engineering
   c. EECS 270 – Applications of Electronics and Devices

ii. *Fluids and Solids*
   a. CIV_ENV 216 – Mechanics of Materials I
   b. MECH_ENG 241 – Fluid Mechanics I

iii. *Thermodynamics* – choose one from below
   a. MECH_ENG 220 – Thermodynamics I
   b. CHEM 342-1 – Kinetics and Statistical Thermodynamics

iv. Choose one course from the areas of material science and engineering, system engineering and analysis, computer architecture and numerical methods, and computer programming
   a. MAT_SCI 201 – Introduction to Materials
   b. MAT_SCI 301 – Materials Science Principles
   c. CHEM_ENG 210 – Analysis of Chemical Process Systems (1 unit MTS, 0 unit ET)
   d. CIV_ENV 304 – Civil and Environmental Engineering System Analysis (0.5 units ET)
   e. IEMS 310 – Operations Research
   f. IEMS 313 – Deterministic Models and Optimization
   g. IEMS 326 – Economics and Finance for Engineers
   h. EECS 203 – Introduction to Computer Engineering
   i. EECS 205 – Fundamentals of Computer System Software
   j. EECS 328 – Numerical Methods for Engineers
   k. ES_APPM – 346 – Modeling and Computation in Science and Engineering (0.8 units MTS, 0.2 units ET)
   l. EECS 211 – Object-Oriented Programming in C++
   m. EECS 317 – Data Management and Information Processing
   n. EECS 230 – Programming for Computer Engineers
   o. EECS 231 – Advanced Programming for Computer Engineers

6. *Social Science and Humanities (7 units)*

Seven courses are required to satisfy the requirements of this subgroup. They must be chosen by the student and approved by the student's advisor and by the Dean for Undergraduate Affairs. A copy of the Social Science/Humanity Theme Form is shown in Table CEE.1 and is provided at the end of this handbook for easy access. The selection must meet either option A or option B as described below.

Option A: At least two courses must be chosen in each of three areas:
   (i) social and behavioral science
   (ii) historical studies and values
   (iii) fine arts, language and literature

Of the seven courses, no more than three of the seven courses may be at 100-level and three courses must be thematically related to provide depth.

Option B: Courses must be thematically related and no more than five courses may come from a single area listed above.

Courses taken for a student's Social Science/Humanities requirement must be approved in advance by the McCormick Humanities Panel. Foreign language study can be incorporated into the program, but should be started as early as possible, preferably in the freshman year. Complete requirement information is at the McCormick Undergraduate Engineering Office web site, http://www.mccormick.northwestern.edu/undergraduates/curriculum/theme/index.html.

7. *Unrestricted Electives (5 units)*

Unrestricted electives allow the students to take any course offered for credit by any school in the University so long as they have the prerequisites for it. Civil Engineering students have five unrestricted electives as part of the McCormick School Core Courses. Many students use these to broaden their education by concentrating them in a particular areas (such as economics or a foreign language or music), while others take additional technical electives in their major or related fields.

B. **Civil Engineering Major**

Additional 16 units beyond the McCormick Core Courses are required for the Civil Engineering major. The units are distributed among four categories: *core courses* (7 units), *mathematical techniques and science* (2 units), *design and synthesis* (2 units), and *technical electives* (5 units).

1. *Civil Engineering Core Courses (7units)*

The Civil Engineering core courses provide the students with the fundamentals in at least four major areas in civil engineering: environmental, geotechnical, structural, and transportation engineering; and in construction management. The list of core courses is:

i. CIV_ENV 221 – Theory of Structures I
ii. CIV_ENV 325 – Reinforced Concrete Design
iii. CIV_ENV 250 – Soil Mechanics
iv. CIV_ENV 260 – Fundamental of Environmental Engineering
v. CIV_ENV 330 – Construction Management
vi. CIV_ENV 340 – Fluid Mechanics II
vii. choose one of the following,
    a. CIV_ENV 371 – Transportation Planning and Analysis
    b. CIV_ENV 376 - Transportation System Operations

In compliance with ABET accreditation criteria, the following courses must be taken in sequence: 205-2→216→221→325; 205-2→ME 241→250; ME 241→340.

2. *Mathematical Techniques and Science (2 units)*

i. At least one course must be a calculus-based probability/statistics course,
    a. CIV_ENV 306 (0.5 unit MTS, 0.5 unit TE) – Uncertainty Analysis in Civil Engineering
    b. CIV_ENV 304 (0.5 unit MTS, 0.5 unit TE) – Civil and Environmental Engineering Systems
    c. IEMS 201 – Introduction to Statistics
    d. IEMS 202 – Probability
    e. STAT 210 – Introduction to Statistics

ii. One course from those listed below, *no 399 course is allowed*.
   a. Any course 300 level or above from the Mathematics Department.
   b. Any course 200 level or above in Biological Sciences, Chemistry, Geological Sciences (Earth and Planetary Science), Environmental Science, or Physics; plus CHEM 103 or PHYSICS 135-3
   c. ENV_SCI 201 – Earth: A Habitable Planet
   d. ENV_SCI 202 – The Health of the Biosphere
   e. Any course 300 level or above from Engineering Science and Applied Mathematics

3. *Design and Synthesis (2 units)*

The design and synthesis elective is intended to provide the students with design experience beyond the core courses. *Note: You must meet pre-requisite requirements to be in compliance with ABET accreditation criteria.*

i. CIV_ENV 382 – Capstone Design (pre-req. 221, 250, 371/376, co-req. 340)
ii. choose one from,
   a. CIV_ENV 323 – Structural Steel Design (pre-req. 221)
   b. CIV_ENV 336 – Project Scheduling (pre-req. 330)
   c. CIV_ENV 352 – Foundation Engineering (pre-req. 250, *offer winter odd year*)
   d. CIV_ENV 395 – Special Topics (must be design class)
   e. CIV_ENV 399 – Projects (must be design project approved by ABET Coordinator, *one 399 is allowed*)
   f. CIV_ENV 421 – Prestressed Concrete (pre-req. 325, *requires instructor permission and a permission number from CEE Office*)

4. *Technical Electives (5 units)*

Technical electives provide the students the opportunity to focus on a specialty area within civil engineering or to combine engineering with management or other fields. While the choices for technical electives are broad, there are still some restrictions. Selection of technical electives must meet the following:

i. A minimum of 18 units of "Engineering Topics" from 48 units is required for the BSCE degree. Note that NOT every course from every department in McCormick is classified as an engineering topic. Student should consult his/her advisor on courses classified as engineering topics. The course partitioning among mathematics and basic science, engineering topics, and general education for all the courses offered in McCormick School is available at http://www.mccormick.northwestern.edu/undergraduates/curriculum/abet_outcomes/abet_course_partitioning.php
ii. Any course, 200 level or above in the McCormick School or Weinberg College of Arts and Sciences, Departments of Astronomy, Biological Science, Chemistry, Geological Science, Physics, Mathematics, provided the course supports the student's field of specialty, and that 18 units of Engineering Topics are taken.
iii. A comprehensive list of approved courses, "Suggested electives for BSCE Specialty Concentration for Jr/Sr 2012-2013", is provided in Table CE.2 and can be downloaded from the Department web site, http://cee.northwestern.edu/undergraduate/civil_engineering/civil_curriculum.html

iv. Other courses from Weinberg College of Arts and Sciences or Kellogg may be approved upon petition.

v. GEN_ENG 220-1, 2 (a total of 1 credit) may be counted as one of five TE courses.

5. *Professionalism and Life-Long Learning*

All seniors are encouraged and highly recommended to take CivEnv 301-1,2 – Professional Development Seminar I, II. This is a no credit, no tuition course series on the review for Fundamental of Engineering Exam, discussions on professional ethics and life-long learning.

C. Tables, Charts, and Forms for BSCE

The Department has developed a number of tables, charts, and forms that you may need or find them useful in helping you plan and keep track of your course of studies. They are also available on the CEE website, http://www.civil.northwestern.edu/undergraduate/civil_engineering/civil_curriculum.html.

These tables, charts, and forms are:

Table CE.2 – Sample BSCE Curriculum Flow Chart

Table CE.3 – Suggested Electives for BSCE Specialty Area 2012-2013

- 3a Architectural Engineering
- 3b Construction Management
- 3c Environmental Engineering
- 3d Geotechnical Engineering
- 3e Structural Engineering
- 3f Transportation Analysis and Planning

Table CE.4 – Summary of MTS and ET Topics Units in BSCE

Table CE.5 – BSCE Program Check-Off Sheet

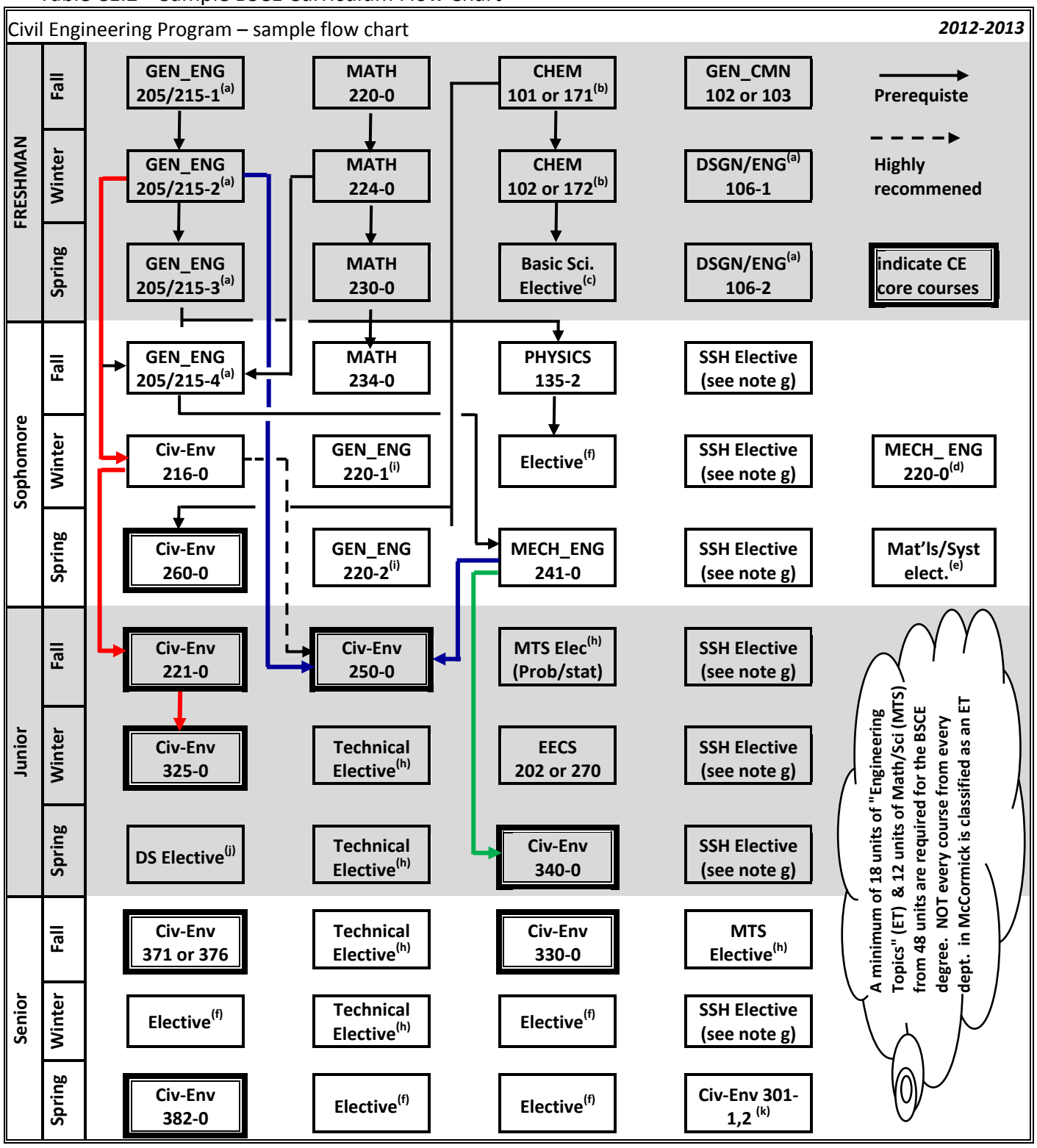
Table CE.2 shows a flow chart for a typical BSCE curriculum by quarters. This flow chart, also displays the pre-requisite requirements, is intended to be a guide for program planning. Almost all of the students entering Northwestern University have accepted Advanced Placement (AP) credits. Many students also interested in pursuing a dual major, minor, certificate program, etc. Each student's program flow chart is likely to be different.

Table CE.2 lists the suggested technical electives courses, currently available, grouped by specialty area to help the students select the courses that match their interest. Students interested is pursuing interest in research, projects not available in courses offered by the department, McCormick School, or the University may register for CIV_ENV 399 – Project Application for an Independent Study. This independent study course carries one course unit and can be used to meet the technical elective requirement or design synthesis if there is sufficient design content. Students interested in registering for CIV_ENV 399 **must** submit a petition form, available at the end of this handbook, signed by both the project advisor and the ABET coordinator.

In order to be in compliance with ABET accreditation requirements that any ABET accredited engineering program must consist of a minimum of 12 units of math/science (MTS) and 18 units of engineering topics (ET). Table CE.4, also available at the end of this handbook, shows a summary of MTS and ET unit distribution of all the required and elective courses in your program that consist of any of the MTS and ET distribution. The MTS and ET distribution of all courses offered in McCormick can be found on the McCormick web site http://www.mccormick.northwestern.edu/undergraduates/curriculum/abet_outcomes/abet_course_partitioning.php

Students' degree records are kept in the McCormick Office of Undergraduate Studies. Your undergraduate academic progress is monitored by that Office. The Office maintains a program check off sheet which summarizes the courses you take and transfer, including AP, to Northwestern. A copy of the check off sheet is shown in Table CE.5 and is also available at the end of this handbook.

Table CE.2 Sample BSCE Curriculum Flow Chart



Please see notes on the page followed.

Table CE.3 (*continued*) Sample BSCE Curriculum Flow Chart

Notes for the sample curriculum flowchart:

a. Must register both courses concurrently.
b. Completion of CHEM 171 & 172 meets the requirement of CHEM 101, 102, & 103. CHEM 171 replaces CHEM 101 & 102.
c. MUST choose from biological sciences and earth and planetary science lists in Basic Sciences.
d. May choose between MECH_ENG 220 and CHEM 342-1.
e. May choose from material science, systems engrg. & analysis, computer architecture & numerical analysis, & computer programming lists in Basic Engrg.
f. May choose from any course offered for credit by the University.
g. Courses must be selected to meet the Social Science-Humanities theme requirement.
h. Choose courses from the approved list (**see next page**). One MTS elective must be a calculus-based probability/statistics – Civ_Env 306 recommended (50% math). A ***minimum of 12 units of Math/Science and 18 units of Engineering Topics (ET) from 48 units are required for BSCE***. Consult with your academic advisor and the partitioning table at http://www.mccormick.northwestern.edu/undergraduates/curriculum/abet_outcomes/abet_course_partitioning.php
i. GEN_ENG 220-1, 2 (for a total of 1 credit) are recommended choice for technical electives.
j. Choose from Civ_Env 323, 336, 352, 395 (must be design class), 399 (must be design project approved by ABET Coordinator), 421
k. All seniors are encouraged and highly recommended to take CivEnv 301-1,2 – Professional Development Seminar I, II. This is a no credit, no tuition course series on the review for Fundamental of Engineering Exam, professional ethics & life-long learning.
l. The following courses must be taken in sequence: 205-2→216→221→325 (red path in the flow chart); 205-2→ME 241→250 (blue path in the flow chart); ME 241→340 (green path in the flow chart).
m. You must meet pre-requisite requirements to be in compliance with ABET accreditation criteria

Table CE.3a Suggested Electives for BSCE Architectural Engineering Concentration 2012-2013

Course No.	Course Title	Prerequisites	Quarter	Design Units
CivEnv 304	Civil & Environ Engrg Systems Analysis	MATH 224	Sp	0
CivEnv 306	Uncertainty analysis in Civil Engineering	MATH 230	F	0
CivEnv 385-1	AE&D I: Fundamentals of Design	Co-req CivEnv 221	F	
CivEnv 385-2	AE&D II: Intermediate Studio	Co-req CivEnv 325	W	
CivEnv 385-3	AE&D III: Advanced Studio	Co-req CivEnv 325	Sp	
CivEnv 323	Structural Steel Design	CivEnv 221	Sp	1.0
CivEnv 352	Foundation Engineering	CivEnv 250	W(O)	1.0
CivEnv 395	Special Topics in Civil Engineering	varies	F,W,Sp	varies
CivEnv 398-1,2	Community-Based Design	jr/sr BSEE or BSCE	F,W,Sp	1.0, 1.0
CivEnv 399	Projects	approved by ABET coord.	F,W,Sp	varies

NOTE: F = fall quarter, W = winter quarter, Sp = spring quarter; O = odd year, E = even year; inst per = instructor permission; equiv = equivalent
All CivEnv 400 level courses requires instructor permission AND permission number from CEE office.
All 399 courses require submission of a course proposal and approval from ABET Coordinator.

IMPORTANT NOTICE: A minimum of 18 units of "Engineering Topics" from 48 units is required for the BSCE degree. NOT every course from every department in McCormick is classified as an engineering topic. Before registering please consult with your advisor and http://www.mccormick.northwestern.edu/undergraduates/curriculum/abet_outcomes/abet_course_partitioning.php for course partitioning of math/science and engineering topics.

Table CE.3b Suggested Electives for BSCE Construction Management Concentration 2012-2013

Course No.	Course Title	Prerequisites	Quarter	Design Units
CivEnv 304	Civil & Environ Engrg Systems Analysis	MATH 224	Sp	0
CivEnv 306	Uncertainty analysis in Civil Engineering	MATH 230	F	0
CivEnv 320	Structural Analysis – Dynamics	CivEnv 221	F	0.5
CivEnv 323	Structural Steel Design	CivEnv 221	Sp	
CivEnv 332	Construction Estimating	CivEnv 330 & inst per	Sp	0.25
CivEnv 336	Project Scheduling	CivEnv 330 or inst per	W	1.0
CivEnv 338	Public Infrastructure Management	Sr		0.5
CivEnv 352	Foundation Engineering	CivEnv 250	W(O)	1.0
CivEnv 395	Special Topics in Civil Engineering	varies	F,W,Sp	varies
CivEnv 399	Projects	approved by ABET coord.	F,W,Sp	varies
CivEnv 421	Prestressed Concrete	CivEnv 325		1.0
CivEnv 451	Engineering Properties of Soils	CivEnv 250, or inst per		0.5

NOTE: F = fall quarter, W = winter quarter, Sp = spring quarter; O = odd year, E = even year; inst per = instructor permission; equiv = equivalent
All CivEnv 400 level courses requires instructor permission AND permission number from CEE office.
All 399 courses require submission of a course proposal and approval from ABET Coordinator.

IMPORTANT NOTICE: A minimum of 18 units of "Engineering Topics" from 48 units is required for the BSCE degree. NOT every course from every department in McCormick is classified as an engineering topic. Before registering please consult with your advisor and http://www.mccormick.northwestern.edu/undergraduates/curriculum/abet_outcomes/abet_course_partitioning.php for course partitioning of math/science and engineering topics.

Table CE.3c Suggested Electives for BSCE Environmental Engineering Concentration 2012-2013

Course No.	Course Title	Prerequisites	Quarter	Design Units
CivEnv 302	Engineering Law	Jr/sr	Sp	0.25
CivEnv 304	Civil & Environ Engrg Systems Analysis	MATH 224	Sp	0
CivEnv 306	Uncertainty analysis in Civil Engineering	MATH 230	F	0
CivEnv 323	Structural Steel Design	CivEnv 221	Sp	1.0
CivEnv 361-1	Environmental Microbiology			
CivEnv 361-2	Public and Environmental Health	CivEnv 361-1		
CivEnv 363	Environ Engineering Applications I: Air & Land	Jr		0.5
CivEnv 364	Environ Engineering Applications II: Water	MECH_ENG 241, CivEnv 340 recomm		0.5
CivEnv 365	Environmental Laboratory	jr		0.125
CivEnv 367	Aquatic Chemistry	CHEM 103 or inst. per		0.125
CivEnv 395	Special Topics in Civil Engineering	varies	F,W,Sp	varies
CivEnv 398-1,2	Community-Based Design	jr/sr BSEE or BSCE	F,W,Sp	1.0, 1.0
CivEnv 399	Projects	approved by ABET coord.	F,W,Sp	varies
CivEnv 440	Environmental Transport Processes	PHYS 135-2; MECH_ENG 241 or equiv		0.25
CivEnv 441	Methods of Microbial Complexity	CivEnv 367		0.125
CivEnv 444	Physical/Chemical Processes in Environmental Control	CivEnv 367, CivEnv 440 or equiv, or inst per		

NOTE: F = fall quarter, W = winter quarter, Sp = spring quarter; O = odd year, E = even year; inst per = instructor permission; equiv = equivalent
All CivEnv 400 level courses requires instructor permission AND permission number from CEE office.
All 399 courses require submission of a course proposal and approval from ABET Coordinator.

IMPORTANT NOTICE: A minimum of 18 units of "Engineering Topics" from 48 units is required for the BSCE degree. NOT every course from every department in McCormick is classified as an engineering topic. Before registering please consult with your advisor and http://www.mccormick.northwestern.edu/undergraduates/curriculum/abet_outcomes/abet_course_partitioning.php for course partitioning of math/science and engineering topics.

Table CE.3d Suggested Electives for BSCE Geotechnical Engineering Concentration 2012-2013

Course No.	Course Title	Prerequisites	Quarter	Design Units
CivEnv 302	Engineering Law	Jr/sr	Sp	0.25
CivEnv 304	Civil & Environ Engrg Systems Analysis	MATH 224	Sp	0
CivEnv 306	Uncertainty analysis in Civil Engineering	MATH 230	F	0
CivEnv 323	Structural Steel Design	CivEnv 221	Sp	1.0
CivEnv 327	Finite Element Methods in Mechanics	MECH_ENG 262, MATH 215 or CivEnv 216 & inst per	F	0.125
CivEnv 332	Construction Estimating	CivEnv 330 & inst per	Sp	0.25
CivEnv 336	Project Scheduling	CivEnv 330 or inst per	W	1.0
CivEnv 352	Foundation Engineering	CivEnv 250	W(O)	1.0
CivEnv 395	Special Topics in Civil Engineering	varies	F,W,Sp	varies
CivEnv 398-1,2	Community-Based Design	jr/sr BSEE or BSCE	F,W,Sp	1.0, 1.0
CivEnv 399	Projects	approved by ABET coord.	F,W,Sp	varies
CivEnv 413	Experimental Stress Analysis	CivEnv 216		0.25
CivEnv 417-1	Mechanics of Continua I	GEN_ENG 205-2,3, MATH 240		0
CivEnv 417-2	Mechanics of Continua II	CivEnv 417-1		
CivEnv 451	Engineering Properties of Soils	CivEnv 250 or equiv		0.5

NOTE: F = fall quarter, W = winter quarter, Sp = spring quarter; O = odd year, E = even year; inst per = instructor permission; equiv = equivalent
All CivEnv 400 level courses requires instructor permission AND permission number from CEE office.
All 399 courses require submission of a course proposal and approval from ABET Coordinator.

IMPORTANT NOTICE: A minimum of 18 units of "Engineering Topics" from 48 units is required for the BSCE degree. NOT every course from every department in McCormick is classified as an engineering topic. Before registering please consult with your advisor and http://www.mccormick.northwestern.edu/undergraduates/curriculum/abet_outcomes/abet_course_partitioning.php for course partitioning of math/science and engineering topics.

Table CE.3e Suggested Electives for BSCE Structural Engineering Concentration 2012-2013

Course No.	Course Title	Prerequisites	Quarter	Design Units
CivEnv 302	Engineering Law	Jr/sr	Sp	0.25
CivEnv 304	Civil & Environ Engrg Systems Analysis	MATH 224	Sp	0
CivEnv 306	Uncertainty analysis in Civil Engineering	MATH 230	F	0
CivEnv 319	Theory of Structures II	CivEnv 221	W	
CivEnv 320	Structural Analysis – Dynamics	CivEnv 221	F	0.5
CivEnv 323	Structural Steel Design	CivEnv 221	Sp	1.0
CivEnv 327	Finite Element Methods in Mechanics	MECH_ENG 262, MATH 215 or CivEnv 216 & inst per	F	0.125
CivEnv 332	Construction Estimating	CivEnv 330 & inst per	Sp	0.25
CivEnv 336	Project Scheduling	CivEnv 330 or inst per	W	1.0
CivEnv 338	Public Infrastructure Management	Sr		0.5
CivEnv 352	Foundation Engineering	CivEnv 250	W(O)	1.0
CivEnv 395	Special Topics in Civil Engineering	varies	F,W,Sp	varies
CivEnv 399	Projects	approved by ABET coord.	F,W,Sp	varies
CivEnv 413	Experimental Stress Analysis	CivEnv 216		0.25
CivEnv 417-1	Mechanics of Continua I	GEN_ENG 205-2,3; MATH 240		0
CivEnv 417-2	Mechanics of Continua II	CivEnv 417-1		
CivEnv 421	Prestressed Concrete	CivEnv 325		1.0
CivEnv 451	Engineering Properties of Soils	CivEnv 250 or equiv		0.5

NOTE: F = fall quarter, W = winter quarter, Sp = spring quarter; O = odd year, E = even year; inst per = instructor permission; equiv = equivalent
All CivEnv 400 level courses requires instructor permission AND permission number from CEE office.
All 399 courses require submission of a course proposal and approval from ABET Coordinator.

IMPORTANT NOTICE: A minimum of 18 units of "Engineering Topics" from 48 units is required for the BSCE degree. NOT every course from every department in McCormick is classified as an engineering topic. Before registering please consult with your advisor and http://www.mccormick.northwestern.edu/undergraduates/curriculum/abet_outcomes/abet_course_partitioning.php for course partitioning of math/science and engineering topics.

Table CE.3f Suggested Electives for BSCE Transportation Systems Analysis and Planning Concentration 2012-2013

Course No.	Course Title	Prerequisites	Quarter	Design Units
CivEnv 304	Civil & Environ Engrg Systems Analysis	MATH 224	Sp	0
CivEnv 306	Uncertainty analysis in Civil Engineering	MATH 230	F	0
CivEnv 323	Structural Steel Design	CivEnv 221	Sp	1.0
CivEnv 352	Foundation Engineering	CivEnv 250	W(O)	1.0
CivEnv 395	Special Topics in Civil Engineering	varies	F,W,Sp	varies
CivEnv 398-1,2	Community-Based Design	jr/sr BSEE or BSCE	F,W,Sp	1.0, 1.0
CivEnv 399	Projects	approved by ABET coord.	F,W,Sp	varies
IEMS 304	Statistical Methods for Data Mining	IEMS 303 or equiv		0
ECON 310-1	Microeconomics I	ECON 201, 202, MATH 220		0
ECON 354	Issues in Urban and Regional Economics	ECON 281, 310-1,2		0
ECON 355	Transportation Economics and Public Policy	ECON 281, 310-1,2		0
ECON 381-1	Econometrics I	STAT 210 or equiv, ECON 310-1, 311		0
ECON 381-2	Econometrics II	ECON 381-1		0

NOTE: F = fall quarter, W = winter quarter, Sp = spring quarter; O = odd year, E = even year; inst per = instructor permission; equiv = equivalent
All CivEnv 400 level courses requires instructor permission AND permission number from CEE office.
All 399 courses require submission of a course proposal and approval from ABET Coordinator.

IMPORTANT NOTICE: A minimum of 18 units of "Engineering Topics" from 48 units is required for the BSCE degree. NOT every course from every department in McCormick is classified as an engineering topic. Before registering please consult with your advisor and http://www.mccormick.northwestern.edu/undergraduates/curriculum/abet_outcomes/abet_course_partitioning.php for course partitioning of math/science and engineering topics.

Table CE.4 Summary of MTS and ET Topic Units in BSCE

Student Name: **Student ID:**

Unit Count	Category	Courses with **Math/Science** Topics	Quarter	Grade	Units
1	Math	Math 220 – Differential Calculus of 1 Variable Function			1.0
2		Math 224 – Integral Calculus of 1 Variable Function			1.0
3		Math 230 – Differential Calculus of Multi-variable Function			1.0
4		Math 234 – Multiple Variable Integration & Vector Calculus			1.0
5-7	Engrg Anal & Computer	Gen_Eng 205-1 – Engineering Analysis I			0.8
		Gen_Eng 205-2 – Engineering Analysis II			0.5
		Gen_Eng 205-3 – Engineering Analysis III			0.8
		Gen_Eng 205-4 – Engineering Analysis IV			0.9
8	Basic Science	Chem 101 – General Chemistry			1.0
9		Chem 102 – General Inorganic Chemistry			1.0
10		Physics 135-2 – General Physics			1.0
11		other basic science			1.0
12	MTS electives	*Calculus-based probability/statistics elective 0.5 MTS min.*			x1
13		*Elective must have at least 0.5 MTS unit*			x2
				Total Math/Science units (*minimum of 12***) =11+x1+x2**	

Unit Count	Category	Courses with **Engineering Topics**	Quarter	Grade	Units
1	Design	IDEA 106-1 – Engineering Design/Communication			0.5
		IDEA 106-2 – Engineering Design/Comm			0.5
2	Engrg Anal & Computer	Gen_Eng 205-1 – Engineering Analysis I			0.2
		Gen_Eng 205-2 – Engineering Analysis II			0.5
		Gen_Eng 205-3 – Engineering Analysis III			0.2
		Gen_Eng 205-4 – Engineering Analysis IV			0.1
3	Basic Engrg	Civ_Env 216 – Mechanics of Materials			1.0
4		Mech_Eng 220 – Thermodynamics I			1.0
5		Mech_Eng 241 – Fluid Mech I			1.0
6		EECS 202 – Intro to EE			1.0
7		*elective courses are in italic fonts*			x3
8	Major Courses	Civ_Env 221 – Theory of Structures I			1.0
9		Civ_Env 222 – Structural Steel Design			1.0
10		Civ_Env 250 – Intro to Soil Mechanics			1.0
11		Civ_Env 260 – Fund Environ Engineering			1.0
12		Civ_Env 330 – Construction Management			1.0
13		Civ_Env 340 – Fluid Mechanics II			1.0
14		Civ_Env 371 – Transportation Plan/Analysis			1.0
15	Design Synthesis	Civ_Env 382 – Capstone Design			1.0
16		*Must be design*			1.0
17	Technical Electives	*elective courses are in italic fonts*			x4
18		*elective courses are in italic fonts*			x5
19		*elective courses are in italic fonts*			x6
20		*elective courses are in italic fonts*			x7
21		*elective courses are in italic fonts*			x8
22					
23					
24					
25					
26					
27					
				Total Engineering Topic units (*minimum 18 units***) = 15+x3+x4+x5+x6+x7+x8**	

Table CE.5 BSCE Program Check-Off Sheet

BSCE Check off Sheet 2012-2013 Catalog

Name: Student ID:

P/N: No courses within the 16 department curriculum to be taken P/N.

	1	2	3	4	5	6	7	8	9	10	11	12
MATHEMATICS												
Math 220												
224												
230												
234												
ENGINEERING ANALYSIS & COMPUTER PROFICIENCY												
Gen_Eng 205-1												
205-2												
205-3												
205-4												
BASIC SCIENCE												
Chem 101												
Chem 102/171												
Physic 135-2												
Biol_Sci												
or Earth & Planetary Sciences/Astronomy area.												
DESIGN & COMMUNICATIONS												
DSGN 106-1,2												
English 106-1,2												
Speech												
BASIC ENGINEERING												
CEE 216												
ME 241												
Thermo												
EE 202/270/ME 202												
*												
SOCIAL SCIENCE/HUMANITIES - THEME												
UNRESTRICTED ELECTIVES												
OTHER COURSES												

	1	2	3	4	5	6	7	8	9	10	11	12
MAJOR COURSES												
CEE 221												
CEE 250												
CEE 260												
CEE 325												
CEE 330												
CEE 340												
CEE 371/376												
MATHEMATICAL TECHNIQUES & SCIENCE No 399 allowed												
CEE 306*												
* or 1 from IEMS 201,202, Math 310-1, Stat 210, 330-1, 302												
TECHNICAL ELECTIVES												
DESIGN & SYNTHESIS												
CE 382												

QTR	CP	AT	PTS	Q.AVG	CP	AT	PTS	CUM
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
CRDV (CO-OP) QTR								

*Basic Engineering Elective: One course selected from Sys Engineering & Analysis, Comp Arch, Programming or Materials Science

Technical Electives: 5 courses - 200-level or above in Engineering, Biol, Chem, Earth & Planetary Sci, Physics, Math, (Econ 310-1, 354, 355 or 381-1,2 by petition). Only 1 unit of 399 is allowed. Design and Synthesis Courses: CEE 323, 336, 352, (395 or 399 if design approved by pet by ABET coordinato

Students must meet the 18 ET and 12 MTS units. See http://www.mccormick.northwestern.edu/undergraduates/curriculum/abet_outcomes/abet_course_partitioning.php

For Academic Services Office Use Only

____ Completed
____ Cr, CEEB, AP
____ Winter Qrt.
____ Spring Qrt.
____ Needed
==========
____ Total

CIVIL ENGINEERING 2012 - EA/DTC
8/24/2012

Bachelor of Science in Environmental Engineering (BSEE)

The Bachelor of Science in Environmental Engineering at Northwestern University is accredited by the Engineering Accreditation Commission of the ABET, Inc. (http://abet.org)

Program Educational Objectives

The Environmental Engineering Program Educational Objectives (PEO) are:

E. Graduates excel in the engineering practice, research and management associated with the protection and conservation of ecological and human health.
F. Graduates play key roles in the analysis of the behavior of complex natural and engineered environmental systems and design infrastructure in a sustainable way to meet societal needs.
G. Graduates apply their broad environmental engineering training to excel and become leaders in a diverse range of professions including engineering consulting, industry, medicine, law, government, and education.
H. Graduates think critically, behave ethically and consider the technical and social consequences of their work, especially as it affects the health, safety and environment of both ecological and human communities.
I. Graduates apply their knowledge creatively and innovatively throughout their careers to meet the challenges posed by a rapidly changing world.

Student Learning Outcomes

The student learning outcomes (a) through (k) of the BSEE program at Northwestern University are those required in ABET criterion 3. Outcome (l) is specified by the American Academy of Environmental Engineers (AAEE). These outcomes are:

(a) an ability to apply knowledge of mathematics, science, and engineering
(b) an ability to design and conduct experiments, as well as to analyze and interpret data
(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
(d) an ability to function on multidisciplinary teams
(e) an ability to identify, formulate, and solve engineering problems
(f) an understanding of professional and ethical responsibility
(g) an ability to communicate effectively
(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
(i) a recognition of the need for, and an ability to engage in life-long learning
(j) a knowledge of contemporary issues
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice
(l) Understanding of concepts of professional practice and the roles and responsibilities of public institutions and private organizations pertaining to environmental engineering.

The student learning outcomes support the program educational objectives given above. The relationship of student outcomes to program educational objectives showing how the PEO are attained is given in Table EE.1 and posted on the department web site http://www.civil.northwestern.edu/undergraduate/environmental_engineering/environmental_curriculum.html. In this Table, PEO A, *Excel in the engineering practice, research and management*

associated with the protection and conservation of ecological and human health, is attained through outcomes (a), (e), (k) and (l). Similarly, PEO B is attained through outcomes (c), (d), (f), (h), (j), and (k); PEO C is attained through outcomes (c), (e), (f), (g), (h), (i) and (k); PEO D is attained through outcomes (f), (h), (i), (j), and (k); and PEO E is attained through outcomes (a), (b), (d), (e), (g), and (i).

Program Requirements

The minimum number of units required for the BSCE degree is 48 units. Among them are:

McCormick core course (32 units)

- Mathematics (4 units)
- Engineering Analysis and Computer Proficiency (4 units)
- Design and Communications (3 units)
- Basic Engineering (5 units) Basic Sciences (4 units) – Physics, Chemistry, an d1 unit of other basic science)
- Social Sciences and Humanities (7 units)
- Unrestricted Electives (5 units)

Environmental Engineering Major (16 units)

- Environmental Engineering Core Courses (12 units)
- Technical Electives (4 units)

The 48 units of courses must also meet the following criteria

1. Minimum of 3 units of Environmental Engineering technical electives must carry 100% of Engineering topic.
2. The only courses in the BSEE Core Courses that are eligible for P/N option are the seven (7) social science/humanities and five (5) unrestricted elective courses. Only four (4) 100- or 200-level courses may be taken P/N to satisfy the 7-unit requirement in the social science/ humanities. Courses taken abroad for a grade, but recorded by the Northwestern University Registrar as P/N, may be exempted from this requirement.
3. A maximum of eight (8) P/N option units are permitted among 48 units required in satisfying the graduation requirement.
4. Only 1 unit per quarter may be taken P/N during freshman and sophomore years.
5. A ***minimum of 18 units of "Engineering Topics" from 48 units is required for the BSEE degree***. Note that NOT every course from every department in McCormick is classified as engineering topic. Please consult with your advisor and McCormick partition list[2] on courses classified as engineering topics.
6. A GPA of NOT less than 2.0 is required for all units presented for the BSEE degree.

[2] McCormick partition list is available on the web, http://www.mccormick.northwestern.edu/undergraduates/bachelors-degree-curriculum/abet-outcomes/abet-course-partitioning.php

Table EE.1 Mapping of BSEE Program Educational Objectives and Student Learning Outcomes

BSEE Program Educational Objectives	**BSEE Student Learning Outcomes**
A. Excel in the engineering practice, research and management associated with the protection and conservation of ecological and human health.	(a) Ability to apply knowledge of mathematics, science, and engineering. (e) Ability to identify, formulate and solve engineering problems. (k) Ability to use the techniques, skills, and modern engineering tools necessary for professional engineering practice. (l) Understanding of concepts of professional practice and the roles and responsibilities of public institutions and private organizations pertaining to environmental engineering.
B. Play key roles in the analysis of the behavior of complex natural and engineered environmental systems and design infrastructure in a sustainable way to meet societal needs.	(c) Ability to design a system, component, or process to meet desired needs. (d) Ability to function on multidisciplinary teams. (e) Ability to identify, formulate and solve engineering problems. (f) Understanding of professional and ethical responsibility. (h) Broad education necessary to understand the impact of engineering solutions in a global and societal context. (j) Knowledge of contemporary issues. (k) Ability to use the techniques, skills, and modern engineering tools necessary for professional engineering practice.
C. Apply their broad environmental engineering training to excel and become leaders in a diverse range of professions including engineering consulting, industry, medicine, law, government, and education.	(c) Ability to design a system, component, or process to meet desired needs. (e) Ability to identify, formulate and solve engineering problems. (f) Understanding of professional and ethical responsibility. (g) Ability to communicate effectively. (h) Broad education necessary to understand the impact of engineering solutions in a global and societal context. (i) Recognition of the need for, and an ability to engage in life-long learning. (k) Ability to use the techniques, skills, and modern engineering tools necessary for professional engineering practice.
D. Think critically, behave ethically and consider the technical and social consequences of their work, especially as it affects the health, safety and environment of both ecological and human communities.	(f) Understanding of professional and ethical responsibility. (h) Broad education necessary to understand the impact of engineering solutions in a global and societal context. (i) Recognition of the need for, and an ability to engage in life-long learning. (j) Knowledge of contemporary issues. (k) Ability to use the techniques, skills, and modern engineering tools necessary for professional engineering practice.
E. Apply their knowledge creatively and innovatively throughout their careers to meet the challenges posed by a rapidly changing world.	(a) Ability to apply knowledge of mathematics, science, and engineering. (b) Ability to design and conduct experiments, as well as to critically analyze and interpret data *in more than one major environmental engineering focus area*. (d) Ability to function on multidisciplinary teams. (e) Ability to identify, formulate and solve engineering problems (g) Ability to communicate effectively. (i) Recognition of the need for, and ability to engage in life-long learning.

Detailed Program Requirements

A. <u>McCormick School Core Courses (32 Units)</u>

The McCormick School (MEAS) Core Courses has 7 subgroups: *Basic Sciences* (4 units), *Engineering Analysis* (4 units), *Mathematics and Sciences* (4 units), *Design and Communications* (3 units), *Basic Engineering* (5 units), *Social Sciences/Humanities* (7 units), and *unrestricted electives* (5 units). This group of courses is largely "menu-driven" in that options are provided to permit different engineering disciplines to select specific courses in several of these categories (and further sub-categories) from a fixed set of courses so as to focus on the needs of the particular discipline. If the discipline elects not to specify courses to be taken for that discipline, the student is free to choose from the list of courses offered for each sub-group. These options apply mainly to the sub-groups of Basic Sciences, Basic Engineering, and to a limited extent, the communications portion of Design and Communications (1 elective course). Considerable latitude is afforded in the selection of courses in the Social Science/Humanities sub-group. Unrestricted electives permit a student to take any course offered for credit by the University (so long as applicable pre-requisites are satisfied).

1. *<u>Basic Sciences (4 units)</u>*

   All civil engineering undergraduates are required to take

   v. CHEM 101 – General Chemistry
   vi. CHEM 102 – General Inorganic Chemistry
   vii. CHEM 103 – General Physical Chemistry
   viii. PHYSICS 135-2 – General Physics 2

2. *<u>Engineering Analysis (4 units)</u>*

   v. GEN_ENG 205-1 – Engineering Analysis I (introduction to linear algebra and Matlab)
   vi. GEN_ENG 205-2 – Engineering Analysis II (introduction to vector mechanics, statics, dynamics, mechanics of materials)
   vii. GEN_ENG 205-3 – Engineering Analysis III (dynamics behavior of the elements)
   viii. GEN_ENG 205-4 – Engineering Analysis IV (solution methods for ordinary differential equations)

3. *<u>Mathematics (4 units)</u>*

   v. MATH 220 – Differential Calculus of One-Variable Functions
   vi. MATH 224 – Integral Calculus of One-Variable Functions
   vii. MATH 230 – Differential Calculus of Multivariable Functions
   viii. MATH 234 – Multiple Integration and Vector Calculus

4. *<u>Design and Communications (3 units)</u>*

   iv. DSGN 106-1,2 (0.5 unit each) – Engineering Design and Communication
   v. ENG 106-1,2 (0.5 unit each) – Writing in Special Contexts, must be taken concurrently with DSGN 106-1,2.
   vi. choose one from:
      a. GEN_CMN 102 – Public Speaking
      b. GEN_CMN 103 – Analysis and Performance of Literature

5. *Basic Engineering (5 units)*

Civil Engineering students are required to take 5 basic engineering courses from four different areas. These courses are:

v. *Systems Engineering and Analysis* – choose one from below
   a. CIV_ENV 304 – Civil and Environmental engineering Systems analysis
   b. IEMS 326 -

vi. *Fluids and Solids*
   a. MECH_ENG 241 – Fluid Mechanics I

vii. *Thermodynamics* – choose one from below
   a. BMD_ENG 250 – Thermodynamics I
   b. CHEM_ENG 211 – Kinetics and Statistical Thermodynamics
   c. MAT_SCI 314 -

viii. *Probability, Statistics, and Quality Control* – choose one from below
   a. BMD_ENG 220
   b. CHEM_ENG 312
   c. CIV_ENV 306 (recommended) – Uncertainty Analysis
   d. EECS 302
   e. IEMS 303
   f. MECH_ENG 359

ix. Choose one from below
   a. EECS 328
   b. MAT_SCI 201 – Principles of the Properties of Materials
   c. MAT_SCI 301

6. *Social Science and Humanities (7 units)*

Seven courses are required to satisfy the requirements of this subgroup. They must be chosen by the student and approved by the student's advisor and by the Dean for Undergraduate Affairs. A copy of the Social Science/Humanity Theme Form is shown in Table CEE.1 and is provided at the end of this handbook for easy access. The selection must meet either option A or option B as described below.

Option A: At least two courses must be chosen in each of three areas:
   (i) social and behavioral science
   (ii) historical studies and values
   (iii) fine arts, language and literature

Of the seven courses, no more than three of the seven courses may be at 100-level and three courses must be thematically related to provide depth.

Option B: Courses must be thematically related and no more than five courses may come from a single area listed above.

Courses taken for a student's Social Science/Humanities requirement must be approved in advance by the McCormick Humanities Panel. Foreign language study can be incorporated into the program, but should be started as early as possible, preferably in the freshman year. Complete requirement information is at the McCormick Undergraduate Engineering Office web site, http://www.mccormick.northwestern.edu/undergraduates/curriculum/theme/index.html.

7. *Unrestricted Electives (5 units)*

Unrestricted electives allow the students to take any course offered for credit by any school in the University so long as they have the prerequisites for it. Civil Engineering students have five unrestricted electives as part of the McCormick School Core Courses. Many students use these to broaden their education by concentrating them in a particular areas (such as economics or a foreign language or music), while others take additional technical electives in their major or related fields.

B. Environmental Engineering Major

Additional 16 units beyond the McCormick Core Courses are required for the Environmental Engineering major. The units are distributed between core courses (12 units) and technical electives (4 units).

1. *Environmental Engineering Core Courses (12 Units)*

The core courses provide the students with the necessary complements in Biology and Chemistry taught in an engineering context as well as Earth Science fundamentals and specialized engineering courses. This suite of classes leads to the senior Capstone Design course (CIV_ENV 382) that brings together students from Civil and Environmental degrees, working in teams. The Environmental Engineering builds on a suite of gateway courses – that are now cross listed with Environmental Science courses - to more advanced courses that are shared with beginning graduate students entering our MS and PhD programs. The program offers some flexibility, dear to Northwestern students that have wide academic interests.

i. CIV_ENV 201 – Earth: a Habitable Planet
ii. CIV_ENV 202 – Health of the Biosphere
iii. CIV_ENV 203 – Energy and the Environment: The Automobile
iv. CHEM 201 – Organic Chemistry I
v. CIV_ENV 260 – Fundamentals of Environmental Engineering
vi. CIV_ENV 340 – Fluid Mechanics II
vii. CIV_ENV 362-1 – Environmental Microbiology
viii. CIV_ENV 363 – Environmental Applications I: Air and Land
ix. CIV_ENV 364 – Environmental Applications II: Water
x. CIV_ENV 365 – Environmental Laboratory
xi. CIV_ENV 367 – Aquatic Chemistry
xii. CIV_ENV 382 – Capstone Design

2. *Technical Electives*

Technical electives provide the students the opportunity to tailor their interests to specific aspects of Environmental Engineering. While there is, to some extent, a broad range of options, there is however one restriction: three (3) of the four (4) courses selected must be engineering topic (ET) courses. This restriction effectively enforces the minimum requirement of 18 credits of ET courses. The student has to consult her/his advisor in order to select the specific courses since not all courses taught in the McCormick School of Engineering carry full ET credits. The course partitioning among mathematics and basic science, engineering topics, and general education for all the courses offered in McCormick School is available online[3].

[3] McCormick partition list is available on the web, http://www.mccormick.northwestern.edu/undergraduates/bachelors-degree-curriculum/abet-outcomes/abet-course-partitioning.php

Choose four courses from below and three of them must be engineering topic courses

i. CIV_ENV 303 – Environmental Law (*not classified as an engineering topic course*)
ii. CIV_ENV 314 – Organic Geochemistry (*not classified as an engineering topic course*)
iii. CIV_ENV 355 – Engineering Aspects of Groundwater Flow
iv. CIV_ENV 360 – Environmental Impact Evaluation
v. CIV_ENV 361-2 – Public and Environmental Health
vi. CIV_ENV 368 – Sustainability: Issues and Actions, Near and Far
vii. CIV_ENV 398-1 – Community Based Design I
viii. CIV_ENV 398-2 – Community Based Design II
ix. CIV_ENV 440 – Environmental Transport Processes
x. CIV_ENV 441 – Methods in Microbial Complexity
xi. CIV_ENV 442 – Processes in Environmental Biotechnology
xii. CIV_ENV 444 – Physical/Chemical Processes in Environmental Control
xiii. CHEM 210-2 – Organic Chemistry II (*not classified as an engineering topic course*)
xiv. BIOL_SCI 210-1,2 – Biochemistry (*not classified as an engineering topic course*)
xv. CHEM_ENG (CBE) 275 – Molecular and Cell Biology for Engineers (*not classified as an engineering topic course*)

C. Tables, Charts, and Forms for BSCE

The Department has developed a number of tables, charts, and forms that you may need or find them useful in helping you plan and keep track of your course of studies. These tables, charts, and forms are provided at the end of this handbook for easy access. They are also available on the CEE website, http://www.civil.northwestern.edu/undergraduate/environmental_engineering/environmental_curriculum.html. These tables, charts, and forms are:

Table EE.2 – Sample BSEE Curriculum Flow Chart
Table EE.3 – Summary of MTS and ET Topics Units in BSEE
Table EE.4 – BSEE Program Check-Off Sheet

Table EE.2 shows a flow chart for a typical BSEE curriculum by quarters. This flow chart, also displays the pre-requisite requirements, is intended to be a guide for program planning. Almost all of the students entering Northwestern University have accepted Advanced Placement (AP) credits. Many students also interested in pursuing a dual major, minor, certificate program, etc. Each student's program flow chart is likely to be different.

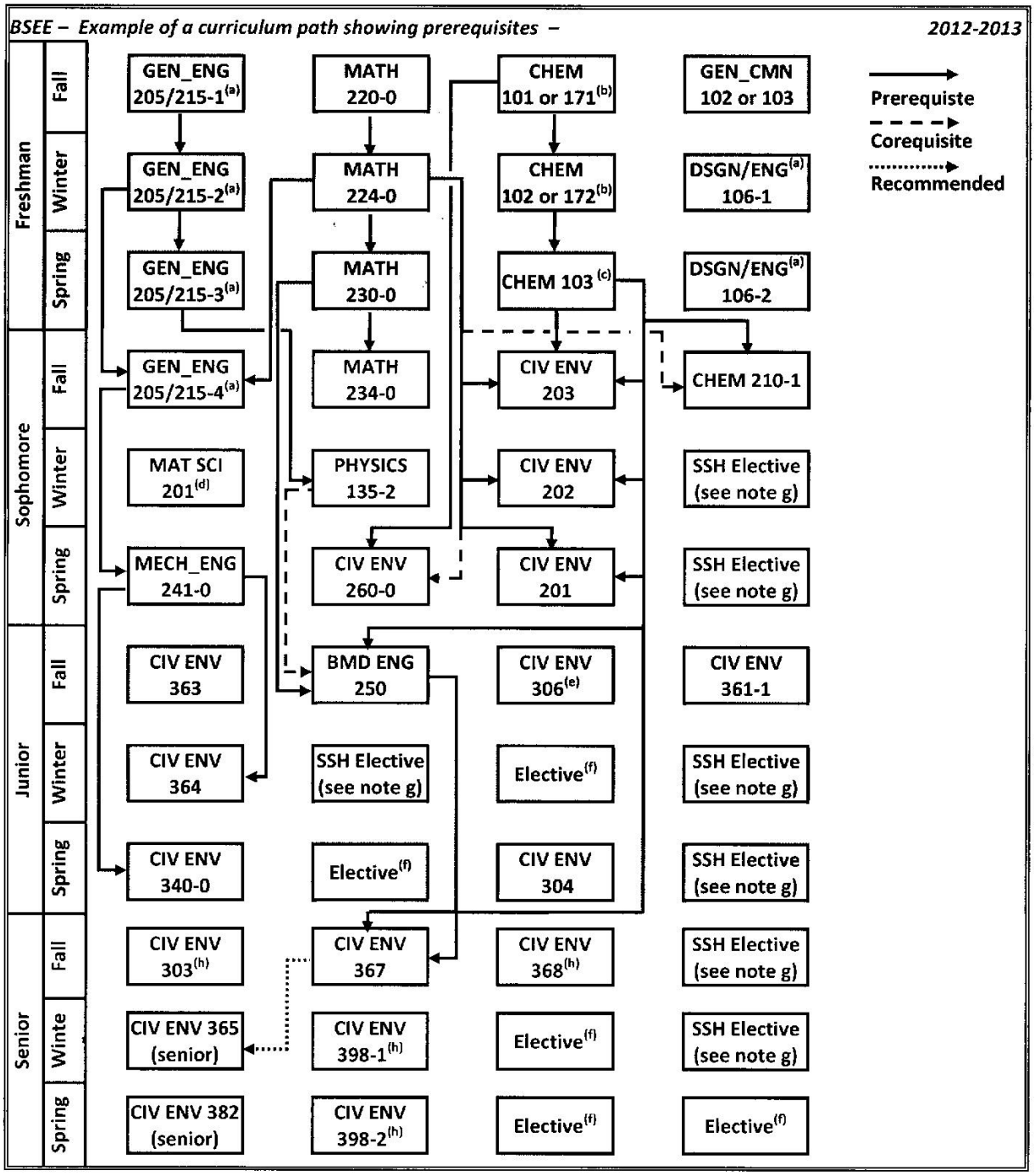
Students interested is pursuing interest in research, projects not available in courses offered by the department, McCormick School, or the University may register for CIV_ENV 399 – Project Application for an Independent Study. This independent study course carries one course unit and can be used to meet the technical elective requirement or design synthesis if there is sufficient design content. Students interested in registering for CIV_ENV 399 **must** submit a petition form, available at the end of this handbook, signed by both the project advisor and the ABET coordinator.

In order to be in compliance with ABET accreditation requirements that any ABET accredited engineering program must consist of a minimum of 12 units of math/science (MTS) and 18 units of engineering topics (ET). Table EE.3, also available at the end of this handbook, shows a summary of MTS and ET unit distribution of all the required and elective courses in your program that consist of any of the MTS and ET distribution. The MTS and ET distribution of all courses offered in McCormick can be found on the McCormick web site

http://www.mccormick.northwestern.edu/undergraduates/curriculum/abet_outcomes/abet_course_partitioning.php

Students' degree records are kept in the McCormick Office of Undergraduate Studies. Your undergraduate academic progress is monitored by that Office. The Office maintains a program check off sheet which summarizes the courses you take and transfer, including AP, to Northwestern. A copy of the check off sheet is shown in Table EE.4 and it is also available at the end of this handbook.

Table EE.2 Sample BSEE Curriculum Flow Chart



Notes:

a. Must register both courses concurrently.
b. Completion of CHEM 171 & 172 meets the req't of CHEM 101, 102, & 103. Completion of CHEM 101 & 171 meets the req't of CHEM 101 & 102.
c. If satisfactorily completed CHEM 171 & 172, take ENVR_SCI 201
d. May be substituted by MAT SCI 301
e. May choose from Basic Engineering Probability, Statistics, and Quality Control list.
f. May choose from any course offered for credit by the University.
g. Courses must be selected to meet the Social Science-Humanities requirement.
h. Choose courses from the approved list: **at least 3 must carry 100% Engineering topic**; CIV ENV 368 not offered in 2012-2013.

Table EE.3 Summary of MTS and ET Units in BSEE

Student Name: Student ID:

Unit Count	Category	Courses with **Math/Science** Topics	Quarter	Grade	Units
1	Math	Math 220 – Diff. Calc of 1 Variable Fnctn			1.0
2		Math 224 – Integ Calc of 1 Variable Fnctn			1.0
3		Math 230 – Diff Calc of Multvarbl Fnctn			1.0
4		Math 234 – Mult Integration & Vector Calc			1.0
5-7	Engrg Anal & Computer	Gen_Eng 205-1 – Engineering Analysis I			0.8
		Gen_Eng 205-2 – Engineering Analysis II			0.5
		Gen_Eng 205-3 – Engineering Analysis III			0.8
		Gen_Eng 205-4 – Engineering Analysis IV			0.9
8	Basic Science	Chem 101 – General Chemistry			1.0
9		Chem 102 – General Inorganic Chemistry			1.0
10		Chem 103 – General Physical Chemistry			1.0
11		Physics 135-2 – General Physics			1.0
	Basic Engrg	*System Engineering and Analysis elective*			X1
		Probability, Statistics, and Quality Control elective			X2
12	Major Courses	Civ_Env 201 – Earth, A Habitable Planet			1.0
13		Civ_Env 202 – Health of Biosphere			1.0
14		Chem 210-1 – Organic Chem			1.0
	Technical Electives	*Elective course is in italic fonts*			X3
					Total Math/Science units = 14.0+X1+X2+X3

Unit Count	Category	Courses with **Engineering Topics**	Quarter	Grade	Units
1	Design	IDEA 106-1 – Engineering Design/Comm			0.5
		IDEA 106-2 – Engineering Design/Comm			0.5
2	Engrg Anal & Computer	Gen_Eng 205-1 – Engineering Analysis I			0.2
		Gen_Eng 205-2 – Engineering Analysis II			0.5
		Gen_Eng 205-3 – Engineering Analysis III			0.2
		Gen_Eng 205-4 – Engineering Analysis IV			0.1
3	Basic Engrg	Mech_Eng 241 – Fluid Mech I			1.0
4		Thermodynamics elective			1.0
		Systems Engineering and Analysis elective			X4
		Probability, Statistics, and Quality Control elective			X5
5		Basic Engineering elective			1.0
6		Civ_Env 203 – Energy and the Environment:The Automobile			1.0
7	Major Courses	Civ_Env 260 – Fund Environ Engineering			1.0
8		Civ_Env 340 – Fluid Mechanics II			1.0
9		Civ_Env 362-1 – Envir Microbiology			1.0
10		Civ_Env 363 – Envir Engineering App I: Air & Land			1.0
11		Civ_Env 364 – Envir Engineering App II: Water			1.0
12		Civ_Env 365 – Envir Engrg Lab			1.0
13		Civ_Env 367 – Aquatic Chem			1.0
14		Civ_Env 382 – Capstone Design			1.0
15	*Technical Electives*	*Elective course must have 100% engineering topic*			1.0
16		*Elective course must have 100% engineering topic*			1.0
17		*Elective course must have 100% engineering topic*			1.0
		Elective course			X6
					Total Engineering Topic units = 17.0+X4+X5+X6

Table EE.4 BSEE Program Check-Off Sheet

BSEE Check Off Sheet 2012-2013 Catalog

Name: Student ID:

P/N: No courses within the 16 department courses can be taken P/N.

	1	2	3	4	5	6	7	8	9	10	11	12
MATHEMATICS												
Math 220												
224												
230												
234												
ENGINEERING ANALYSIS & COMPUTER PROFICIENCY												
Gen_Eng 205-1												
205-2												
205-3												
205-4												
BASIC SCIENCE												
Chem 101												
Chem 102/171												
Chem 103/172												
Physics 135-2												
DESIGN & COMMUNICATIONS												
DSGN 106-1,2												
English 106-1,2												
Speech												
BASIC ENGINEERING												
BME250/MSc314/ChE 211												
ME 241												
CEE 304 rec. or IE 326												
Prob												
EECS 328/												
ES/AM 346/ MSc 201												
SOCIAL SCIENCE/HUMANITIES - THEME												
UNRESTRICTED ELECTIVES												
OTHER COURSES												

	1	2	3	4	5	6	7	8	9	10	11	12
MAJOR COURSES												
Chem 210-1												
CEE 201												
CEE202												
CEE 203												
CEE 260												
CEE 340												
CEE 361												
CEE 363												
CEE 364												
CEE 365												
CEE 367												
CEE 382												
TECHNICAL ELECTIVES - see below												

QTR	CP	AT	PTS	Q.AVG	CP	AT	PTS	CUM
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								

CRDV (CO-OP) QTR

Technical Electives: 2 courses from CEE 303, 355, 360, 361-2, 368, 395 (need pet), 398-1,2, 399 (1 unit only), 440, 441, 442, 444 (need pet). Chem 210-2, Biol_ Sci 215, 216; Chem Eng 275; Earth 314; 2 courses that are 200-level or higher in engineering or math or science. 3 courses need to have 100% engineering topics.

Students must meet the 12 ET and 18 MBST units. See http://www.mccormick.northwestern.edu/undergraduates/curriculum/abet_outcomes/abet_course_partitioning.php

For Academic Services Office Use Only

_____ Completed
_____ Cr, CEEB, AP
_____ Winter Qrt.
_____ Spring Qrt.
_____ Needed
==========
_____ Total

ENVIRONMENTAL ENGINEERING 2012 - EA/DTC
8/23/2012

Minor in Environmental Engineering

Minor Requirements (8 units)

Core courses (6 units)

CIV_ENV 201 – Earth: a Habitable Planet
CIV_ENV 202 – Health of Biosphere
CIV_ENV 203 – Energy and the Environment: The Automobile
CIV_ENV 260 – Fundamentals of Environmental Engineering
CIV_ENV 363 – Environmental Applications I: Air and Land
CIV_ENV 364 – Environmental Applications II: Water

Electives (2 units)

Choose 2 courses from below:

i. CIV_ENV 340 – Fluid Mechanics II
ii. CIV_ENV 361-1 – Environmental Microbiology
iii. CIV_ENV 362-2 – Public and Environmental Health
iv. CIV_ENV 367 – Aquatic Chemistry
v. CIV_ENV 368 – Sustainability: Issues and Actions, Near and Far
vi. CIV_ENV 398-1 – Community Based Design I
vii. CIV_ENV 398-2 – Community Based Design II
viii. CIV_ENV 399 – Independent Study (*limited to 1 unit*)
ix. Any CIV_ENV 400 level course by permission

Additional Information

1. No more than 4 courses may be used to fulfill requirements in the major program.
2. A grade of at least C– is required in each course for the minor.
3. Students should discuss with the minor coordinator how best to satisfy prerequisites for required courses.
4. A completed Declaration for the Environmental Engineering minor must be submitted to the McCormick Academic Services Office before the beginning of the final undergraduate quarter.

Architectural Engineering and Design Certificate Program

The Architectural Engineering and Design Certificate Program requires a mixture of design imagination, knowledge of materials and systems, and a variety of analytic and management tools. Architects, who traditionally have led the design effort, are best known for the aesthetic element of their products. It is the integration of architecture and engineering perspectives that leads to buildings that are path-breaking in functionality, aesthetics, economy, and sustainability. This certificate prepares students for further pursuit of architecture-related careers.

Required Courses for all Engineers

1. CIV_ENV 385-1 – Design Studio I: Fundamentals – Self-referential design problem. *Junior or senior standing; co-requisite: CIV_ENV 221*.
2. CIV_ENV 385-2 – Design Studio II: Intermediate – Contextual design problem. *Prerequisite: CIV_ENV 385-1; co-requisite: CIV_ENV 325.*
3. CIV_ENV 385-3 – Design Studio III: Advanced – Complex design problem. *Prerequisite: CIV_ENV 385-2; co-requisite: CIV_ENV 325.*
4. GEN_ENG 220 – Analytic and Computer graphics (CAD)
5. Choose one course from:
    i. CIV_ENV 323 – Structural Steel Design
    ii. CIV_ENV 352 – Foundation Engineering
6. ART HIST – 232 Introduction to the History of Architecture and Design

Additional courses for students not majoring in civil engineering. (These are already in the basic civil engineering program)

1. CIV_ENV 221 Theory of Structures 1 (pre-requisite: CIV_ENV 216 or equivalent)
2. CIV_ENV 325 Reinforced Concrete

Limits to Double Counting Courses

No more than two the courses needed for the Certificate in Architectural Engineering and Design may also be used to fulfill the requirements in the major program of your BS degree as described in the undergraduate catalog.

Recommended Technical or Unrestricted Electives for Certificate Program

1. PROJ_MGT 441 – Sustainability in Construction (0.5 course unit)
2. PROJ_MGT 455 – Computer-Integrated Project Delivery (0.5 course unit)
3. CIV_ENV 302 – Engineering Law
4. CIV_ENV 304 – Civil and Environmental Engineering Systems Analysis
5. CIV_ENV 336 – Project Scheduling
6. DSGN 370 – Engineering Portfolio
7. DSGN courses

Recommended Unrestricted Electives for Certificate Program (Could be used as components of theme requirements)

1. ART HIST 370 1, 2 Modern Architecture and Design
2. Art Theory and Practice (select one course)
    i. ART 120 – Basic Painting or
    ii. ART 125 – Basic Drawing or
    iii. ART 140 – Basic Sculpture
    iv. Advanced courses in Art Theory and Practice
3. History and/or Sociology
    i. HISTORY 322-1, 2 – Development of the Modern American City
    ii. SOCIOL 207 – Problems of Cities
    iii. SOCIOL 301 – The City: Urbanization and Urbanism

Recommended Internships for Certificate Program

1. Summer experiences related to architecture and/or building design or construction, or
2. Participation in Co-operative engineering program
3. Summer international workshop as available

Additional Conditions for Awarding Certificate in Architectural Engineering and Design

1. Completion of all requirements for McCormick B.S. degree.
2. Maintenance of GPA of 2.0 or above in courses required for this certificate
3. Courses with grades lower than a "C" will not be accepted
4. Complete the Declaration of Petition to Receive the Certificate in Architectural Engineering and Design form available online http://www.civil.northwestern.edu/docs/PDFDocs/AEDDeclarationofPetition2012.pdf or at the end of this handbook.
5. The Declaration form must be completed two weeks before starting your final quarter at Northwestern.

Undergraduate Curriculum Plan

Catalog Year: 2012-2013

Name:

Student ID:

Year	Fall Quarter	Winter Quarter	Spring Quarter
2012-2013			
2013-2014			
2014-2015			
2015-2016			
2016-2017			

Sample 5 year Plan for BSCE and BS in Music of a BSCE student

	Fall	Winter	Spring
Freshman	Chem 101	Chem 102	Chem 103
	Spanish (Lang)	Math 230	Env Sci 201
	Fresh Sem 1 (Val Distro 1)	Intro to Psych (BS Distro 1)	Fresh SEm 2 (Mus Elec)
	Music Comp 111-1 (Mus Elec)	Music Comp 111-2 (Mus Elec)	Music History 213
	Marching Band (0.5 Mus Elec)	Concert Band	
Sophomore	EA 1	EA 2	EA 3
	Chem 201-1	EDC 1	EDC 2
	Env Sci 203	Math 234	Civ_Env 260
	Music Theory 111-1	Music Theory 111-2	Music Theory 111-3
	Marching Band (0.5 Mus Elec)	Music AS 126-2	Music AS 126-3
			ICD 301
Junior	EA 4	Music Theory 211-2	Music Theory 211-3
	Physics 135-2	Thermo (MechE 220)	Fluids I (MechE 241)
	Civ_Env 306(F)	Fluids/Solids 1 (CE 216)	IEMS 326
	Music Theory 211-1	Music History	Mus Hist 216
	Marching Band (0.5 Mus Elec)	GE 220	GE 220
Senior	Marching Band (0.5 Mus Elec)	CE 325	CE 340
	CE 250	TE 4	TE 5 (Econ)
	CE 221	Lit/history/values distro	Anal Perf
	Mus Hist 214	Music	Lit/history/values distro
	EECS 202		
Senior 2	CE 330		CE 382
	CE 306	Lit/history/values distro	Lit/history/values distro
	CE 385-1	CE 385-2	CE 385-3
	Instrumentation	Orchestration	Adv orchestration

SOCIAL SCIENCES/HUMANITIES THEME FORM

McCORMICK SCHOOL OF ENGINEERING and APPLIED SCIENCE

Approved ___/___/___
SDB ____ SES____
Email __ Pick-up __ Check-off __

The Social Sciences/Humanities Requirement consists of 7 courses, chosen according to one of two options in the following 3 areas:

Fine Arts; Literature (Language)	(FAL)
Historical Studies; Values	(HSV)
Social and Behavioral Science	(SBS)

Please complete one of the following options, obtain your advisor's signature, and turn form in to the Academic Services Office, L269. If your form is approved, a copy will be placed in the Theme Book in Room L269. If your form is denied, you will be notified by e-mail. **PLEASE PRINT LEGIBLY IN INK.** Thank you!

NAME: _____

MAJOR: _____ CLASS: _____

Month/Year GRADUATION (IF KNOWN)_____

STUDENT ID: _____

THEME TITLE: _____

_____

OPTION A

- At least 2 courses must be taken in each area
- Of the 7 courses, only 3 may be 100-level
- 3 courses must be thematically related for depth

Theme Courses (The 3 courses that will relate.)

***Example:*

PSY 110-0 Intro to Psychology FALL 02 SBS

DEPT/COURSE#	TITLE	QTR/YR TAKEN	AREA

Alternatives (2): may be substituted for above courses should they be unavailable.

Distribution Courses (4): so that, of the 7 courses, at least 2 are taken in each of the three areas.

Student Signature_____Date_____

Advisor Signature_____Date_____

Approved_____ Date_____

OPTION B

- 5 courses must be thematically related
- No more than 5 courses can come from a single area for breadth

Theme Courses (The 5 courses that will relate.)

***Example:*

PSY 110-0 Intro to Psychology FALL 02 SBS

DEPT/COURSE#	TITLE	QTR/YR TAKEN	AREA

Alternatives (3): may be substituted for above courses should they be unavailable.

Distribution Courses (2): so that no more than 5 of the 7 courses are in any 1 area.

Student Signature_____Date_____

Advisor Signature_____Date_____

Approved_____ Date_____

A list of approved theme courses is available at http://www.mccormick.northwestern.edu/undergraduate

Updated 10/03

Table CEE.2 CIV_ENV 399 Project Application for an Independent Study

1) Your Topic

a. Scope

b. List of project tasks/goals and a tentative weekly schedule

c. References

2) Deliverables

a. Type of product (paper, model, computer program, device, etc)

b. Product details (anticipated length of paper, complexity of model, lines of computer code and extent of documentation, components of devices, etc.)

c. Work involved in product (hours of writing, interviewing, number of laboratory observations, etc.)

3) How does this independent study support your curriculum

a. Courses that led to this one

b. How does this 399 enhance your learning in your civil or environmental engineering degree?

4) **Interaction with professor**
   a. How often will you meet?
   b. Basis of evaluation (give itemized evaluation, example—weekly reports 15%, scholarly/technical component 50%, written report 20%, oral presentation 15%)

5) **Describe how this is to be entered in your grade audit**
   a. Engineering Topic, Unrestricted Elective, Math Technique or Science (MTS), etc
   b. Please describe the characteristics that will contribute to this designation

   c. If this is for lab work, it must involve a significant lab report at the end of the quarter. If the student simply wishes to work in the lab, they still must complete the form. If there is to be no evaluation instrument (graded quizzes or significant report) then such work experience should comprise 0.33 credit.

6) **Signatures** by sponsoring independent study Professor, ABET Coordinator (Prof Dowding for BSCE; Prof Gaillard for BSEE), and student signature verifying that this 399 is to be the one allowed for a Letter Grade (not a "K" for continuing)—unless this is part of the CEE Honors Program.
7) **Honors 399s require these additional considerations:**
   a. Product must meet an Honors Thesis standard, i.e., 399 should include some measure of creativity
   c. Two 399s can be combined to produce one Honors Thesis
   d. Submit this application <u>with</u> the CEE departmental honors program application.

Student Signature_____Date_____
Verifying that this is to be the one allowed 399 for a Letter Grade (not a "K" for continuing)—unless this is part of the CEE Honors Program
PRINT NAME _____

* * *

Sponsoring/Honor Project Advisor Signature _____Date_____

PRINT NAME _____

* * *

ABET Coordinator Signature _____Date_____

PRINT NAME _____

Table CE.4 Summary of MTS and ET Topics Units in BSCE

Student Name: **Student ID:**

Unit Count	Category	Courses with **Math/Science** Topics	Quarter	Grade	Units
1	Math	Math 220 – Differential Calculus of 1 Variable Function			1.0
2		Math 224 – Integral Calculus of 1 Variable Function			1.0
3		Math 230 – Differential Calculus of Multi-variable Function			1.0
4		Math 234 – Multiple Variable Integration & Vector Calculus			1.0
5-7	Engrg Anal & Computer	Gen_Eng 205-1 – Engineering Analysis I			0.8
		Gen_Eng 205-2 – Engineering Analysis II			0.5
		Gen_Eng 205-3 – Engineering Analysis III			0.8
		Gen_Eng 205-4 – Engineering Analysis IV			0.9
8	Basic Science	Chem 101 – General Chemistry			1.0
9		Chem 102 – General Inorganic Chemistry			1.0
10		Physics 135-2 – General Physics			1.0
11		other basic science			1.0
12	MTS electives	*Calculus-based probability/statistics elective 0.5 MTS min.*			x1
13		*Elective must have at least 0.5 MTS unit*			x2
				Total Math/Science units (*minimum of 12***) =11+x1+x2**	

Unit Count	Category	Courses with **Engineering Topics**	Quarter	Grade	Units
1	Design	IDEA 106-1 – Engineering Design/Communication			0.5
		IDEA 106-2 – Engineering Design/Comm			0.5
2	Engrg Anal & Computer	Gen_Eng 205-1 – Engineering Analysis I			0.2
		Gen_Eng 205-2 – Engineering Analysis II			0.5
		Gen_Eng 205-3 – Engineering Analysis III			0.2
		Gen_Eng 205-4 – Engineering Analysis IV			0.1
3	Basic Engrg	Civ_Env 216 – Mechanics of Materials			1.0
4		Mech_Eng 220 – Thermodynamics I			1.0
5		Mech_Eng 241 – Fluid Mech I			1.0
6		EECS 202 – Intro to EE			1.0
7		*elective courses are in italic fonts*			x3
8	Major Courses	Civ_Env 221 – Theory of Structures I			1.0
9		Civ_Env 222 – Structural Steel Design			1.0
10		Civ_Env 250 – Intro to Soil Mechanics			1.0
11		Civ_Env 260 – Fund Environ Engineering			1.0
12		Civ_Env 330 – Construction Management			1.0
13		Civ_Env 340 – Fluid Mechanics II			1.0
14		Civ_Env 371 – Transportation Plan/Analysis			1.0
15	Design Synthesis	Civ_Env 382 – Capstone Design			1.0
16		*Must be design*			1.0
17	Technical Electives	*elective courses are in italic fonts*			x4
18		*elective courses are in italic fonts*			x5
19		*elective courses are in italic fonts*			x6
20		*elective courses are in italic fonts*			x7
21		*elective courses are in italic fonts*			x8
22					
23					
24					
25					
26					
27					
				Total Engineering Topic units (*minimum 18 units***) = 15+x3+x4+x5+x6+x7+x8**	

Table CE.5 BSCE Program Check-Off Sheet

BSCE Check off Sheet 2012-2013 Catalog

Name: Student ID:

P/N: No courses within the 16 department curriculum to be taken P/N.

	1	2	3	4	5	6	7	8	9	10	11	12
MATHEMATICS												
Math 220												
224												
230												
234												
ENGINEERING ANALYSIS & COMPUTER PROFICIENCY												
Gen_Eng 205-1												
205-2												
205-3												
205-4												
BASIC SCIENCE												
Chem 101												
Chem 102/171												
Physic 135-2												
Biol_Sci												
or Earth & Planetary Sciences/Astronomy area.												
DESIGN & COMMUNICATIONS												
DSGN 106-1,2												
English 106-1,2												
Speech												
BASIC ENGINEERING												
CEE 216												
ME 241												
Thermo												
EE 202/270/ME 202												
*												
SOCIAL SCIENCE/HUMANITIES - THEME												
UNRESTRICTED ELECTIVES												
OTHER COURSES												

	1	2	3	4	5	6	7	8	9	10	11	12
MAJOR COURSES												
CEE 221												
CEE 250												
CEE 260												
CEE 325												
CEE 330												
CEE 340												
CEE 371/376												
MATHEMATICAL TECHNIQUES & SCIENCE No 399 allowed												
CEE 306*												
* or 1 from IEMS 201,202, Math 310-1, Stat 210, 330-1, 302												
TECHNICAL ELECTIVES												
DESIGN & SYNTHESIS												
CE 382												

QTR	CP	AT	PTS	Q.AVG	CP	AT	PTS	CUM
1			.	.			.	.
2			.	.			.	.
3			.	.			.	.
4			.	.			.	.
5			.	.			.	.
6			.	.			.	.
7			.	.			.	.
8			.	.			.	.
9			.	.			.	.
10			.	.			.	.
11			.	.			.	.
12			.	.			.	.
13			.	.			.	.
14			.	.			.	.
15			.	.			.	.
CRDV (CO-OP) QTR								

*Basic Engineering Elective: One course selected from Sys Engineering & Analysis, Comp Arch, Programming or Materials Science

Technical Electives: 5 courses - 200-level or above in Engineering, Biol, Chem, Earth & Planetary Sci, Physics, Math, (Econ 310-1, 354, 355 or 381-1,2 by petition). Only 1 unit of 399 is allowed. Design and Synthesis Courses: CEE 323, 336, 352, (395 or 399 if design approved by pet by ABET coordinato

Students must meet the 18 ET and 12 MTS units. See http://www.mccormick.northwestern.edu/undergraduates/curriculum/abet_outcomes/abet_course_partitioning.php

For Academic Services Office Use Only

____ Completed
____ Cr, CEEB, AP
____ Winter Qrt.
____ Spring Qrt.
____ Needed
==========
____ Total

CIVIL ENGINEERING 2012 - EA/DTC
8/24/2012

Table EE.3 Summary of MTS and ET Units in BSEE

Student Name: Student ID:

Unit Count	Category	Courses with **Math/Science** Topics	Quarter	Grade	Units
1	Math	Math 220 – Diff. Calc of 1 Variable Fnctn			1.0
2		Math 224 – Integ Calc of 1 Variable Fnctn			1.0
3		Math 230 – Diff Calc of Multvarbl Fnctn			1.0
4		Math 234 – Mult Integration & Vector Calc			1.0
5-7	Engrg Anal & Computer	Gen_Eng 205-1 – Engineering Analysis I			0.8
		Gen_Eng 205-2 – Engineering Analysis II			0.5
		Gen_Eng 205-3 – Engineering Analysis III			0.8
		Gen_Eng 205-4 – Engineering Analysis IV			0.9
8	Basic Science	Chem 101 – General Chemistry			1.0
9		Chem 102 – General Inorganic Chemistry			1.0
10		Chem 103 – General Physical Chemistry			1.0
11		Physics 135-2 – General Physics			1.0
	Basic Engrg	*System Engineering and Analysis elective*			X1
		Probability, Statistics, and Quality Control elective			X2
12	Major Courses	Civ_Env 201 – Earth, A Habitable Planet			1.0
13		Civ_Env 202 – Health of Biosphere			1.0
14		Chem 210-1 – Organic Chem			1.0
	Technical Electives	*Elective course is in italic fonts*			X3
					Total Math/Science units = 14.0+X1+X2+X3

Unit Count	Category	Courses with **Engineering Topics**	Quarter	Grade	Units
1	Design	IDEA 106-1 – Engineering Design/Comm			0.5
		IDEA 106-2 – Engineering Design/Comm			0.5
2	Engrg Anal & Computer	Gen_Eng 205-1 – Engineering Analysis I			0.2
		Gen_Eng 205-2 – Engineering Analysis II			0.5
		Gen_Eng 205-3 – Engineering Analysis III			0.2
		Gen_Eng 205-4 – Engineering Analysis IV			0.1
3	Basic Engrg	Mech_Eng 241 – Fluid Mech I			1.0
4		Thermodynamics elective			1.0
		Systems Engineering and Analysis elective			X4
		Probability, Statistics, and Quality Control elective			X5
5		Basic Engineering elective			1.0
6		Civ_Env 203 – Energy and the Environment:The Automobile			1.0
7	Major Courses	Civ_Env 260 – Fund Environ Engineering			1.0
8		Civ_Env 340 – Fluid Mechanics II			1.0
9		Civ_Env 362-1 – Envir Microbiology			1.0
10		Civ_Env 363 – Envir Engineering App I: Air & Land			1.0
11		Civ_Env 364 – Envir Engineering App II: Water			1.0
12		Civ_Env 365 – Envir Engrg Lab			1.0
13		Civ_Env 367 – Aquatic Chem			1.0
14		Civ_Env 382 – Capstone Design			1.0
15	*Technical Electives*	*Elective course must have 100% engineering topic*			1.0
16		*Elective course must have 100% engineering topic*			1.0
17		*Elective course must have 100% engineering topic*			1.0
		Elective course			X6
					Total Engineering Topic units = 17.0+X4+X5+X6

Table EE.4 BSEE Program Check-Off Sheet

BSEE Check Off Sheet 2012-2013 Catalog

Name: Student ID:

P/N: No courses within the 16 department courses can be taken P/N.

1	2	3	4	5	6	7	8	9	10	11	12		1	2	3	4	5	6	7	8	9	10	11	12
MATHEMATICS												MAJOR COURSES												
Math 220												Chem 210-1												
224												CEE 201												
230												CEE202												
234												CEE 203												
ENGINEERING ANALYSIS & COMPUTER PROFICIENCY												CEE 260												
Gen_Eng 205-1												CEE 340												
205-2												CEE 361												
205-3												CEE 363												
205-4												CEE 364												
BASIC SCIENCE												CEE 365												
Chem 101												CEE 367												
Chem 102/171												CEE 382												
Chem 103/172												TECHNICAL ELECTIVES - see below												
Physics 135-2																								
DESIGN & COMMUNICATIONS																								
DSGN 106-1,2																								
English 106-1,2																								
Speech												QTR	CP	AT	PTS	Q.AVG	CP	AT	PTS	CUM				
BASIC ENGINEERING												1												
BME250/MSc314/ChE 211												2												
ME 241												3												
CEE 304 rec. or IE 326												4												
Prob												5												
EECS 328/												6												
ES/AM 346/ MSc 201												7												
SOCIAL SCIENCE/HUMANITIES - THEME												8												
												9												
												10												
												11												
												12												
												13												
												14												
												15												
UNRESTRICTED ELECTIVES												CRDV (CO-OP) QTR												
OTHER COURSES																								

Technical Electives: 2 courses from CEE 303, 355, 360, 361-2, 368, 395 (need pet), 398-1,2, 399 (1 unit only), 440, 441, 442, 444 (need pet). Chem 210-2, Biol_ Sci 215, 216; Chem Eng 275; Earth 314; 2 courses that are 200-level or higher in engineering or math or science. 3 courses need to have 100% engineering topics.

Students must meet the 12 ET and 18 MBST units. See http://www.mccormick.northwestern.edu/undergraduates/curriculum/abet_outcomes/abet_course_partitioning.php

For Academic Services Office Use Only

_____ Completed
_____ Cr, CEEB, AP
_____ Winter Qrt.
_____ Spring Qrt.
_____ Needed
==========
_____ Total

ENVIRONMENTAL ENGINEERING 2012 - EA/DTC
8/23/2012

Declaration Form: Minor in Environmental Engineering
McCormick School of Engineering and Applied Science

Name _____EMPLID _____Major_____

Email _____ Planned degree date_____

Part I: Signatures and Declaration of Intent to Pursue Minor
I intend to complete the requirements for the Minor in Environmental Engineering in the McCormick School of Engineering and Applied Science. My academic advisor is aware of this plan, and I have discussed the program requirements with the minor coordinator (Professor Jean-François Gaillard) in the Department of Civil and Environmental Engineering.

Student:_____ Date: _____

Academic Advisor:_____ Date: _____

Minor Coordinator:_____ Date: _____

Part II: General Requirements
Similar to McCormick Curriculum Requirements:
3 units of MATH (220, 224, 230), and 3 units of EA (GEN_ENG 205-1,2,3; or 206-1,2,3).

Part III: Core Requirements
Same as some of the Core requirements of the BSEE Major

Course	Quarter taken	Grade	Comments
1. CIV ENV 201	_____	_____	_____
2. CIV ENV 202	_____	_____	_____
3. CIV ENV 203	_____	_____	_____
4. CIV ENV 260	_____	_____	_____
5. CIV ENV 363	_____	_____	_____
6. CIV ENV 364	_____	_____	_____

Part IV: Electives
Two CIV ENV courses that can be used either to define a specialization area - such as Environmental Chemistry, Microbiology, or Transport Processes - or that can be across these disciplines to show breath in the program: CIV ENV 340, 361-1,2, 367, 368, 398-1,2, 399, or a 400-level course by permission; only 1 CIV ENV 399 unit may be counted toward the minor.

Course	Quarter taken	Grade	Specialization Area
7. _____	_____	_____	_____
8. _____	_____	_____	_____

Certificate course requirements satisfied _____ _____
(EE Minor Coordinator) (date)

Final McCormick Approval _____ _____
(McCormick Associate Dean) (date)

McCormick

Northwestern Engineering

Declaration of Petition to Receive Certificate in Architectural Engineering and Design

Department of Civil and Environmental Engineering

Name: _____ **Student ID:** _____

Major(s): _____ **Net ID:** _____

Email: _____ **Degree date:** _____

Complete the course information in the table below keeping in mind that **no more than two the courses needed for the Certificate in Architectural Engineering and Design may also be used to fulfill the requirements in the major program of your BS degree as described in the undergraduate catalog.** Courses with grades lower than a "C" will not be accepted. You will be notified if your petition is approved or denied. The certificate will be included with your diploma and will appear on your transcript.

This form must be completed two weeks before starting your final quarter at Northwestern. Once this form is completed and signed (by the candidate) please return it to Professor Joseph L. Schofer in Tech L274.

Program Requirements Check Off List

Course Number	Type	Title	Quarter/ yr taken	Grade	CEE initials for approval
Civ_Env 385 (1)	Required	Design Studio I			
Civ_Env 385 (2)	Required	Design Studio II			
Civ_Env 385 (3)	Required	Design Studio III			
GEN_ENG 220	Required	Analytical and Computer Graphics			
CIV_ENV 323 CIV_ENV 352	One Required	Structural Steel Design Foundation Engineering			
ART HIST 232	Required	Introduction to the History of Architecture and Design			
		For Engineers Outside of Civil Engineering			
CIV_ENV 221	Required	Theory of Structures			
CIV_ENV 325	Required	Reinforced Concrete			

Signature of AE&D Student _____ Date _____

Signature of McC Registrar _____ Date _____

Signature of AE&D Manager _____ Date _____

Signature of the Associate Dean _____ Date _____

Department of Civil and Environmental Faculty

Jan Achenbach (Emeritus Professor)
Mechanics of Materials & Solids

Zdeněk Bažant
Structural Engineering & Infrastructural Materials; Mechanics of Materials & Solids

Ted Belytschko
Computation Mechanics

Larry Booth (Clinical Professor)
Architectural Engineering & Design

Karen Chou (Clinical Professor)
Structural Engineering & Infrastructural Materials

David Corr (Clinical Professor)
Structural Engineering & Infrastructural Materials

Isaac Daniel
Mechanics of Materials & Solids

Pablo Durango-Cohen
Transportation Systems Analysis & Planning

Jean-François Gaillard
Environmental Engineering & Science

Ahmad Hadavi (Clinical Professor)
Project Management

Leon Keer (Emeritus Professor)
Mechanics of Materials & Solids

Raymond Krizek
Geotechnical Engineering; Project Management

Hani Mahmassani
Transportation Systems Analysis & Planning

Oluwaseyi Balogun
Mechanics of Materials & Solids

Alex Beghini (Adjunct Professor)
Structural Engineering & Infrastructural Materials

Neil Blair
Environmental Engineering & Science

Giuseppe Buscarnera
Geotechnical Engineering

Mark Clark
Environmental Engineering & Science

Gianluca Cusatis
Structural Engineering & Infrastructural Materials

Charles Dowding
Geotechnical Engineering

Richard Finno
Geotechnical Engineering

Kimberly Gray
Environmental Engineering & Science

Yonggang Huang
Mechanics of Materials & Solids; Structural Engineering & Infrastructural Materials

Sinan Keten
Mechanics of Materials & Solids

Luisa Marcelino (Research Professor)
Environmental Engineering & Science

Yu (Marco) Nie
Transportation Systems Analysis & Planning

Department of Civil and Environmental Faculty

Aaron Packman
Environmental Engineering & Science

Harish Rao (Adjunct Professor)
Environmental Engineering & Science

Joseph Schofer
Transportation Systems Analysis & Planning

Elissa Ship (Adjunct Professor)
Structural Engineering & Infrastructural Materials

Yun Wang
Environmental Engineering & Science

Jianmin Qu
Mechanics of Materials & Solids

John Rudnicki
Mechanics of Materials & Solids

Surendra Shah (Emeritus Professor)
Structural Engineering & Infrastructural Materials

Rich Tilghman (Adjunct Professor)
Project Management

For Questions on Curriculum, petition approval, please see

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Assistant Chair
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Karen-chou@northwestern.edu

Professor Charles Dowding
Associate Chair and ABET Coordinator
Tech A122
c-dowding@northwestern.edu

Professor Jean-François Gaillard
BSEE ABET Coordinator
Tech A324
Jf-gaillard@northwestern.edu

For Questions on registration, permission numbers, and other academic matters, please see

Janet Soule
Academic Coordinator
Tech A236
j-soule@northwestern.edu
7:15 am - 5:00 pm Monday - Thursday