PRINCETON UNIVERSITY

DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING

Academic Guide for the CEE Class of 2021 Entering the Department in 2018-2019

- Architecture and Engineering
- Environmental Engineering
- Geological Engineering
- Structural Engineering
- Engineering and the Liberal Arts
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Departmental Web Page
Additional information on the department can be found at: http://www.princeton.edu/cee
Undergraduate Program Mission Statement

The department’s mission is to prepare students for careers at the forefront of the dynamic fields of civil and environmental engineering. Growing challenges for designing and maintaining societal infrastructure require proper accounting for complex interactions between the built and natural environment. Our aim is to educate students to take leadership roles in identifying emerging issues in these fields and to develop innovative solutions to the engineering challenges of the future.

Our undergraduate curriculum covers the key components of today’s civil and environmental engineering profession. These include the static and dynamic behaviors of structures, construction materials, and geotechnical materials; the workings of the natural environment, how human activities affect the environment, and technologies to monitor, protect and restore the environment; and elements of design and its philosophy.

Because civil and environmental engineers are called upon to work on large projects of an interdisciplinary nature, it is our mission to train students to be able to apply a diverse set of skills to solve complex problems, to work in teams and communicate effectively, and to uphold ethical standards of professional practice.

Program Educational Objectives
Revised by the CEE Faculty May 2012

Objective No. 1 – Our graduates will be able to use science and engineering principles to solve important problems and address technological challenges of the future.

Objective No. 2 – Our graduates will be prepared to play key roles in interdisciplinary efforts and to solve problems that are important to society.

Objective No. 3 – Our graduates will be on a path to leadership positions and be recognized as critical, creative, and independent thinkers.

Objective No. 4 – Our graduates will continue their lifelong learning process to remain effective professionals in the workplace.
Overview of the Undergraduate Program

Princeton’s Department of Civil and Environmental Engineering (CEE) offers students the opportunity to pursue a variety of programs and concentration areas under a common departmental structure. The department supports five track options:

- Architecture and Engineering
- Environmental Engineering
- Geological Engineering
- Structural Engineering
- Engineering and the Liberal Arts

All of the tracks except “Engineering and the Liberal Arts” and “Architecture and Engineering - Architecture Focus” are accredited as civil engineering by the Engineering Accreditation Commission of ABET, www.abet.org. ABET is among the most respected accreditation organizations in the United States, and accreditation ensures that academic programs meet established standards of engineering and technical education.

The CEE curriculum is sufficiently flexible to provide opportunities for students to pursue certificate programs across the University, and to do study-abroad in the junior year.

The Department firmly believes that independent research is an integral component of an engineer’s education. Consequently, all seniors are required to complete a year-long thesis project, write a thesis and present the results of their work at poster and oral sessions throughout the year. Sophomores and juniors are also encouraged to participate in independent research and should take the initiative to discuss their interests with departmental faculty members.

Students in CEE 262 lab.
Course Requirements

Requirements for study in CEE follow the general requirements for BSE students, which are normally completed in the freshman year. These are courses in mathematics, basic sciences, computer science, and writing. After the freshman year, the student's course of study is planned in consultation with academic advisers in the CEE department.

Princeton University requires engineering students to successfully complete a minimum of 36 courses over four years. For CEE students, these typically consist of:

- 8 courses of mathematics, physics, general chemistry, and computer science
- 1 university writing requirement
- 2 additional math requirements
- 1 additional basic science requirement
- 8 engineering science requirements
- 2 engineering design requirements
- 2 course credits of senior thesis
- 3 or more track-specific courses or program electives
- 7 or more electives in humanities and social science

The non-ABET accredited tracks follow different sets of requirements.

The student’s selected track determines the specific engineering science requirements, design requirements, and track-specific requirements. The track also guides the selection of program electives, which are technical courses in engineering, science, economics or mathematics. A maximum of one 200-level course may be chosen as a Program Elective. A student's program electives must provide a coherent sequence in the student’s area of interest. Approval is based on agreement from the advisor and the departmental representative. If a student selects a program elective outside the pre-approved list, the student should make a compelling case for why this is consistent with the student’s educational objectives. Approval is based on agreement from the advisor and the departmental representative.

For the ABET-accredited tracks, a student's program of study must include a minimum of fourteen engineering courses. For this purpose, we do count MAE 305 as an engineering course, but we do not count ORF 245.

The senior thesis is a full-year research project, although seniors register for this course in the Spring Term only. No grade is given in the fall; a double grade is awarded in the spring.

Among the humanities and social sciences electives, BSE students are required to include at least one course in four of the six areas listed:

- Epistemology and Cognition (EC)
- Ethical Thought and Moral Values (EM)
- Foreign Language at or above the 107/108 level
- Historical Analysis (HA)
- Literature and the Arts (LA)
- Social Analysis (SA)

Finally, all of these courses except the humanities and social science electives and any extra program electives must be taken for a grade, i.e. not on a Pass/D/Fail basis. Passing grades must be received in all of these courses.

Individual Programs of Study

In some instances, an exceptional student may wish to design his/her own program, pulling together related courses from different tracks within CEE or from different departments. Such a program must be designed in conjunction with and ultimately approved by the Departmental Representative to ensure that the program is ABET-compliant as a civil engineering program.
Study Abroad

Study abroad can be used to enhance and diversify the educational experience. For many CEE juniors, study abroad has served as a valuable option for junior independent work and in providing important experience for their senior thesis research.

The School of Engineering offers the opportunity to participate in the Oxford Engineering Exchange Program. As part of the Oxford-Princeton Partnership, a select number of juniors in the departments of Electrical Engineering, Civil & Environmental Engineering, and Mechanical and Aerospace Engineering are chosen annually for the prestigious year-long exchange program. Successful applicants are placed in one of Oxford’s 38 colleges and enjoy the full privileges of an Oxford undergraduate student, or “JCR” member. Students take a selection of engineering courses equivalent to Princeton’s junior year requirements, including a fourth-year engineering project.

Courses taken during foreign study must be pre-approved for credit as departmental courses by the department representative. Students considering study abroad should consult with the departmental representative as early as possible.

Senior Thesis

The Senior Thesis, CEE 478, is a year-long research project that is required of all CEE students.

CEE 478 is considered by many Princeton graduates to be one of the most fulfilling academic activities of their four years. The thesis process requires independent work, regular consultation with one’s advisor, submission of two progress reports during the fall semester, a poster session early in the spring semester, submission of the final thesis in April, and an oral presentation in the first week of May.

Students may select from a wide variety of subjects of their own choice or suggested by the faculty. A sample list of senior thesis titles from previous years is available on the CEE website. For administrative reasons; students do not sign up for Senior Thesis in the fall, but instead only sign up in the spring.

The thesis counts as two courses in the spring term of senior year. In view of the SEAS requirement that each student takes at least four courses in any given term, seniors must take at least three courses, in addition to the thesis, each term senior year (regardless of the total number of courses the student has taken).

Departmental GPA, Honors, Awards, and Prizes

Prior to graduation, the Department will calculate each senior student’s departmental grade point average (GPA) to determine degree status and for determination of honors and awards. To graduate, a student’s departmental GPA must be 2.0 or greater. The CEE department uses the following guidelines to determine the departmental courses included in the GPA calculations:

- All 300-level and above engineering science courses, design courses, track-specific requirements, program electives, and senior thesis (which is counted as two courses), taken junior or senior year, plus
- Any of these courses taken freshman or sophomore year that raise the student’s GPA.
- If more than the minimum required Program Electives are taken, the lowest grade of the Program Electives will be dropped. Note that while one 200-level course may be included among the Program Electives, no 200-level courses are counted in the departmental GPA.

Note that “300-level and above courses” means all such courses and not just CEE courses. It should also be noted that the CEE Department does not use the Registrar’s definition of departmental courses to compute the departmental GPA.

Academic honors are bestowed upon graduates with exceptional academic achievement. There are three levels that may be awarded: “honors”, “high honors”, and “highest honors”. Departmental GPA is used in determination of academic honors, but may also include consideration of other factors such as the
quality of the senior thesis. There are no automatic ranges in GPA for awarding honors. Furthermore, to assure that the qualifications for honors remains consistent from year to year, the faculty compares students in one year with those who have received honors in recent years. Academic Honors will be announced on Class Day and printed in the Commencement Program. Honors will also appear on the diploma and transcript.

In addition, the department acknowledges outstanding academic achievement through membership in honor societies, departmental awards, and prizes, as listed below. There are engineering school-wide awards and university awards. A listing of all Princeton University prizes and awards is given in the Undergraduate Announcement.

**Honor Societies**

The Society of Sigma Xi is an international honor society which recognizes excellence in research in science, engineering, or mathematics, demonstrated primarily through the senior thesis.

The Tau Beta Pi Society is a national engineering honor society founded in 1885. Membership is conferred upon students in recognition of superior scholarship and exemplary character.

The Phi Beta Kappa Society is a national academic honor society founded in 1776. It elects the most outstanding students of arts and sciences at America’s leading colleges and universities.

**Awards and Prizes Presented by the Department of CEE**

W. Mack Angas Prize: Awarded to a senior who has an outstanding academic record, shows high promise of achievement in an engineering career, and has been involved in non-academic activities of the CEE Department and the University.

David W. Carmichael Prize: Awarded to a senior in the Structures and Mechanics or Architectural Engineering Programs who has a strong academic record and who has written an outstanding thesis.

Christine Trmal Prize: Awarded to the senior in the Department who has demonstrated excellence in academic studies and who has written an outstanding thesis in Environmental Engineering.

W. Taylor Thom Jr. Prize: Awarded to a senior in the area of Geological Engineering who has a strong academic record and who has written an outstanding thesis.

CEE Book Award: Awarded to a senior who has written an outstanding thesis.

Moles Scholarship: Awarded annually to a deserving and academically qualified junior or senior studying Civil Engineering at Princeton University.

Moles Award: Awarded annually to a junior or senior in recognition of outstanding promise in construction engineering and management.

NJWEA Scholarship: Awarded to a junior or senior in the environmental engineering track whose independent work relates to water.

Achievement Award of the New Jersey Chapter of the American Concrete Institute: A certificate awarded to a senior civil engineer who has demonstrated outstanding achievement in research and design in concrete.

Sigma Xi Book Award: The Sigma Xi Honor Society recognizes students for excellence in research with research potential shown by independent work or senior thesis. The department of Civil and Environmental Engineering recognizes one outstanding individual by presenting the Sigma Xi Book Award.
Research and Teaching Facilities

Qualified students in the Department have access to several unique laboratories used by both students and faculty.

The laboratories of CEE include teaching labs in mechanics, materials, and environmental engineering. Individual faculty members have developed specialized laboratories for research that are used by graduate students and undergraduates doing junior projects or senior theses.

The mechanics and materials lab provides facilities for fabrication of concrete, a computer-controlled testing system for measuring the strength and toughness of building materials, a triaxial testing facility for soil, and a network of computers for simulating and analyzing experiments.

The Department also supports an environmental quality laboratory, where selected aspects of the chemistry and microbiology of water supplies are studied. An active area of interest is the contamination and cleanup of groundwater.

Available equipment includes gas and liquid chromatography with a variety of detectors for very sensitive measurements of chemicals in environmental samples, as well as microscopes, incubators, and environmental chambers for culturing aerobic and anaerobic microorganisms.

Equipment is also available in the Geosciences Department for independent work.

CEE students in the CEE 308 lab.
CEE Track: Architecture and Engineering

Structural engineers should have a sensitivity to the setting and the form of structures such as bridges, towers, and long span roofs. Studies in architecture give engineering students such a perspective. This program, offered jointly by the Department of Civil and Environmental Engineering and the School of Architecture, presents a unique opportunity to combine the curricula of the two schools. Students who successfully complete this program are awarded a Certificate in Architecture and Engineering, which will appear on the transcript at graduation.

Students interested in this program must choose between two options.

In the structures-focus option, the requirements include a strong emphasis on civil and environmental engineering. This program is designed for students who intend to become practicing engineers and may go to graduate school in structural engineering. This track is accredited by ABET under the civil engineering program requirements. Students choosing this option select a structural engineering project as a senior thesis.

In the architecture-focus option, the requirements include a strong emphasis on architecture theory, history and practice. This program is designed for students planning to do graduate work in architecture or to practice engineering in collaboration with architects and planners. Students choosing this option select an architectural design topic as a senior thesis under the direction of advisors from both the School of Architecture and the CEE Department.

In either option, program electives may be selected from courses in engineering, architecture, and art.

Prof. Adriaenssens' student built a prototype of a segmental concrete shell.

Prof. Garlock discusses a model of Chicago's Willis Tower.
CEE Track: Architecture and Engineering – Structural Focus  
(ABET Accredited)  
Class of 2021

BSE Math & Science Requirements (8 Courses)

CHM 201 General Chemistry I  
MAT 103 Calculus  
MAT 104 Calculus  
MAT 201 Multivariable Calculus,  
or MAT 203 Adv. Multivariable Calculus  
MAT 202 Linear Algebra w/ Applications,  
or MAT 204 Adv. Linear Algebra w/ Applications  
PHY 103 General Physics,  
or PHY 105 Adv. Physics  
PHY 104 General Physics,  
or PHY 106 Adv. Physics  
COS 126 General Computer Science

University Writing Seminar (1 Course)

Writing Seminar

Engineering Science Requirements (8 Courses)

CEE 205 Mechanics of Solids _E_  
CEE 262A Structures and the Urban Environment _E_  
CEE 312 Statics of Structures _E_  
CEE 361 Structural Analysis & Finite Elements _E_  
CEE 364 Materials in Civil Eng. _E_ (lab)  
CEE 365 Soil Mechanics _E_  
CEE 207 Intro to Environmental Engineering _E_,  
or CEE 302 Practical Models for Environmental Systems  
or CEE 306 Hydrology _E_  
ARC 374 Computational Design _E_,  
or CEE 463 A Social and Multi-Dimensional Exploration of Structures

Track – Specific Requirements (3 Courses)

ARC 203 Intro. to Architectural Thinking
ARC 204 Intro to Architectural Design (studio)  
ARC 350 Junior Studio (Fall)  
or ARC 351 Junior Studio (Spring)

Additional Math Requirements (2 courses)

ORF 245 Fundamentals of Eng. Statistics,  
or ORF 309 Probability and Stochastic Systems,  
or a suitable substitute course.

This requirement may be waived for students who scored 5 on AP STAT.

MAE 305 Mathematics in Engineering _E_

Additional Science Requirements (1 course)

GEO 203 Geology,  
or EEB 211 Life on Earth: Chaos and Clockwork of Biological Design,  
or MOL 214 Introduction to Cellular and Molecular Biology,  
or MOL 215 Quantitative Principles in Cell and Molecular Biology

This requirement may be waived for students who scored 5 on AP BIO.

Engineering Design Requirements (2 Courses)

CEE 366 Design of Reinforced Concrete Structures _E_  
CEE 461 Design of Large-Scale Structures: Buildings _E_

Independent Work (2 Courses)

CEE 478 Senior Thesis (Counts as two courses) _2xE_

Program Electives (1 or more) – See list.

1. (engineering) _E_

Humanities Electives (7 or more)

1.  
2.  
3.  
4.  
5.  
6.  
7.  
8.  

Sophomore Year(2018-2019)

Fall  
1. MAT 202  
2. CEE 262A  
3. ARC 203  
4. CEE 364 (lab)  
5. 

Spring

1. CEE 205  
2. CEE 312  
3. ARC 204 (studio)  
4.  
5. 

Junior Year(2019-2020)

Fall  
1. CEE 361  
2. ARC 374  
3. ARC 350 (Fall)  
4. CEE 366  
5. 

Spring

1. CEE 365  
2. ORF 245  
3. MAE 305  
4.  
5. 

Senior Year(2020-2021)

Fall

1. (CEE 478)  
2. GEO 203  
3. CEE 207  
4.  
5. 

Spring

1. CEE 478  
2. CEE 461  
3.  
4.  
5. 

* "_E_" indicates engineering course, which counts toward the ABET requirement of 1.5 years of engineering topics.
CEE Track: Architecture and Engineering – Architectural Focus
(Not ABET Accredited)
Class of 2021

BSE Math & Science Requirements (8 Courses)
CHM 201 General Chemistry I
MAT 103 Calculus
MAT 104 Calculus
MAT 201 Multivariable Calculus,
or MAT 203 Adv. Multivariable Calculus
MAT 202 Linear Algebra w/ Applications,
or MAT 204 Adv. Linear Algebra w/ Applications
PHY 103 General Physics, or PHY 105 Adv. Physics
PHY 104 General Physics, or PHY 106 Adv. Physics
COS 126 General Computer Science

University Writing Seminar (1 Course)
Writing Seminar

Engineering Science Requirements (6 Courses)
CEE 205 Mechanics of Solids _E_
CEE 262A Structures and the Urban Environment _E_
CEE 312 Statics of Structures _E_
or CEE 361 Structural Analysis & Finite Elements _E_
CEE 364 Materials in Civil Eng. _E_ (lab)
ARC 311 Building Science: Tech Building Systems _E_
or ARC 463 A Social and Multi-Dimensional Exploration of Structures _E_

Track – Specific Requirements (6 Courses)
ARC 203 Intro. to Architectural Thinking
ARC 204 Intro to Architectural Design (studio)
ARC 403 Topics History & Theory of Architecture
ARC 404 Advanced Design Studio
ARC 350 Junior Studio (Fall)
ARC 351 Junior Studio (Spring)

Freshman Year (2017-2018)

<table>
<thead>
<tr>
<th>Fall</th>
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<tbody>
<tr>
<td>1. MAT 104</td>
<td>1. MAT 201</td>
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<tr>
<td>2. PHY 103</td>
<td>2. PHY 104</td>
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<td>3. CHM 201 or 207</td>
<td>3. COS 126</td>
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Sophomore Year (2018-2019)

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<th>Fall</th>
<th>Spring</th>
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<tbody>
<tr>
<td>1. MAT 202</td>
<td>1. CEE 262A</td>
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<tr>
<td>2. CEE 205</td>
<td>2. CEE 312</td>
</tr>
<tr>
<td>3. ARC 203</td>
<td>3. ARC 204 (studio)</td>
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Junior Year (2019-2020)

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<th>Fall</th>
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<tr>
<td>1. ARC 311</td>
<td>1. ARC 351 (Spring)</td>
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<tr>
<td>2. ARC 374</td>
<td>2. CEE 364</td>
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<tr>
<td>3. ARC 350 (Fall)</td>
<td>3.</td>
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<tr>
<td>4. CEE 366</td>
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Senior Year (2020-2021)

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<th>Fall</th>
<th>Spring</th>
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<tr>
<td>1. (CEE 478)</td>
<td>1. CEE 478</td>
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<tr>
<td>2. ARC 403</td>
<td>2. CEE 461</td>
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<tr>
<td>3. ARC 404 (Studio)</td>
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Additional Math Requirements (None)

Additional Science Requirements (None)

Engineering Design Requirements (2 Courses)
CEE 366 Design of Reinforced Concrete Structures _E_
CEE 461 Design of Large-Scale Structures: Buildings _E_

Independent Work (2 Courses)
CEE 478 Senior Thesis (Counts as two courses) _2x_E_

Program Electives (2 or more) – See list.

1. 
2. 
3. 

Humanities Electives (7 or more)

1. 
2. 
3. 
4. 

* "_E_" indicates engineering course, which counts toward the ABET requirement of 1.5 years of engineering topics.
Approved and Recommended Program Electives for Architecture and Engineering - both focus options

A student’s program electives must provide a coherent sequence in the student’s area of interest. No more than one program elective can be at the 200 level. The courses listed below are highly recommended for this program track. If a student would like to take a program elective not on the list, such as a one-time-only course or a graduate course, the student should make a compelling case for why this is consistent with the student’s educational objectives. Approval of all program electives, including those on the list below, is based on agreement from the advisor and the departmental representative.

*** For the Architecture & Engineering - STR track, at least one of the program electives must be an engineering course.

The bullet (*) indicates courses that are highly recommended as program electives for this program track.

Civil and Environmental Engineering and Other Engineering and Science Departments
Courses in the CEE department that are not part of the current requirements.
In particular, the following are recommended for the Arch & Eng – Structures Focus track:
• CEE 439 Structural Health Monitoring
• CEE 460 Risk Assessment and Management
• CEE 463 A social and Multi-dimensional exploration of Structures
• CEE 467 Design and Behavior Steel Structures
• CEE 477 Engineering Design for Sustainable Development
• CEE 540 Special Topics in MMS: Elements of Conceptual Design and Analysis of Structures
• CEE 566 Wind Engineering and Structural Dynamics
• CEE 568 Adv. Design and Behavior Concrete Structures
• ORF 307 Optimization
• ORF 309 Probability and Stochastic Systems

Courses on Urbanism, Art and Archaeology, and Architectural History
• ARC 201/202: Introductory Drawing (LA)
ARC 302 Architecture and the Visual Arts (LA)
ARC 304 Cities of the 21st Century (HA)
ARC 305 Urban Studies: Analysis of Contemporary Urban Form
ARC 308 History of Architectural Theory (HA)
• ARC 401 Theories of Housing and Urbanism (SA)
ARC 406 Energy and Form
ARC 492 Topics in the Formal Analysis of the Urban Structure
ART 206 Byzantine Art & Architecture (LA)
ART 230 Early Islamic Art and Architecture (LA)
• ART 242 The Experience of Modernity: A Survey of Modern Architecture in the West (LA)
• ART 250 Architecture, Globalization, and the Environment (LA)
ART 308 Roman Cities and Countryside: Republic to Empire (LA)
ART 315 Medieval Architecture (LA)
ART 320 Rome, the Eternal City (LA)
ART 332 The Landscape of Allusion: Garden and Landscape Architecture 1450-1750 (LA)
ART 333 Renaissance & Baroque Architecture (LA)
ART 337 Court, Cloister, and City: Art and Architecture in Central and Eastern Europe (LA)
ART 351 Traditional Chinese Architecture (LA)
ART 443 Global Exchange in Art and Architecture (LA)
ART 445 Topics in the History and Theory of Architecture in Early-Modern Europe (LA)
ART 458 Seminar: Modern Architecture (LA)
URB 201 (Fall or Spring) Introduction to Urban Studies
The environmental engineering track is designed for students who wish to pursue a career related to the environment (engineering, law, business, or medicine) and for students who wish to continue on to advanced graduate studies in environmental engineering or a related earth science discipline. Course work in this track focuses on the analysis of, and engineering solutions to, environmental problems through combined study of the fundamental hydrological and environmental sciences and environmental engineering design.

The requirements in this track provide a foundation in civil and environmental engineering as well as study of water resources, atmospheric processes, and environmental pollution. Students study engineering design in both water pollution technology and sustainable building technology.

The program electives should form a coherent sequence of courses in the student’s area of interest.

This track is accredited by ABET under the civil engineering program requirements.
CEE Track: Environmental Engineering  
(ABET Accredited)  
Class of 2021

**BSE Math & Science Requirements (8 Courses)**
- CHM 201 General Chemistry 1  
- MAT 103 Calculus  
- MAT 104 Calculus  
- MAT 201 Multivariable Calculus, or MAT 203 Adv. Multivariable Calculus  
- MAT 202 Linear Algebra w/ Applications, or MAT 204 Adv. Linear Algebra w/ Applications  
- PHY 103 General Physics, or PHY 105 Adv. Physics  
- PHY 104 General Physics, or PHY 106 Adv. Physics  
- COS 126 General Computer Science

**University Writing Seminar (1 Course)**
- Writing Seminar

**Additional Math Requirements (2 courses)**
- ORF 245 Fundamentals of Eng. Statistics,  
  or ORF 309 Probability and Stochastic Systems, or a suitable substitute course.  
  This requirement may be waived for students who scored 5 on AP STAT.  
- MAE 305 Mathematics in Engineering 1 _E_

**Additional Science Requirements (1 course)**
- GEO 203 Geology,  
  or EEB 211 Life on Earth: Chaos and Clockwork of Biological Design,  
  or MOL 214 Introduction to Cellular and Molecular Biology  
  or MOL 215 Quantitative Principles in Cell and Molecular Biology  
  This requirement may be waived for students who scored 5 on AP BIO.

**Engineering Science Requirements (8 Courses)**
- CEE 205 Mechanics of Solids _E_  
- CEE 207 Intro. to Environmental Eng. _E_  
- CEE 302 Practical Models for Environmental Systems _E_  
- CEE 305 Environmental Fluid Mechanics _E_  
- CEE 306 Hydrology, _E_  
- CEE 308 Environmental Eng. Laboratory _E_ (lab) - Note (a)  
- CEE 311 Global Air Pollution _E_  
- CEE 364 Materials in Civil Eng. _E_  
  or CEE 365 Soil Mechanics

**Engineering Design Requirements (2 Courses)**
- CEE 471 Intro to Water Pollution Technology _E_  
- CEE 477 Eng. Design for Sustainable Development _E_

**Independent Work (2 Courses)**
- CEE 478 Senior Thesis (Counts as two courses) _2xE_

**Program Electives (3 or more) – See list.**
1. (engineering) _E_  
2.  
3.  
4.  
5.  
6.  
7.  
8.  

**Humanities Electives (7 or more)**
1.  
2.  
3.  
4.  
5.  
6.  
7.  
8.  

**Notes:** (a). CEE 308 is offered every other year; students in the class of 2021 may take it in spring of their senior year.  
  * " _E_ " indicates engineering course, which counts toward the ABET requirement of 1.5 years of engineering topics.
Approved and Recommended Program Electives – Environmental Engineering Track

A student’s program electives must provide a coherent sequence in the student’s area of interest. For the environmental engineering track, at least one of the program electives must be an engineering course. No more than one program elective can be at the 200 level. The courses listed below are highly recommended for this program track. If a student would like to take a program elective not on the list, such as a one-time-only course or a graduate course, the student should make a compelling case for why this is consistent with the student’s educational objectives. Approval of all program electives, including those on the list below, is based on agreement from the advisor and the departmental representative. The bullet (*) indicates courses that are highly recommended for this program track.

Civil and Environmental Engineering
Courses in the CEE department that are not part of the current requirements. In particular, the following are recommended for the environmental engineering track:

- CEE 334 Global Environmental Issues
- CEE 361 Structural Analysis & Intro to Finite Elements
- CEE 460 Risk Assessment and Management
- CEE 487 Ecohydrology
- CEE 566 Wind Engineering and Structural Dynamics

Other Engineering and Science Departments
Courses in mechanical engineering, chemical engineering, applied math (includes ORF), geology, biology, chemistry. In particular, the following are recommended for the environmental engineering track:

- MAE 328 Energy for a Greenhouse-Constrained World
- GEO 363 Environmental Geochemistry: Chemistry of the Natural Systems
- GEO 418 Environmental Aqueous Geochemistry
- ORF 309 Probability and Stochastic Systems
- ELE 455 Mid-Infrared Technologies for Health and the Environment
- ELE 428 Cleaner Transport Fuels, Combustion Sensing and Emission Control
CEE Track: Geological Engineering

Geological Engineering is the application of science to problems and projects involving the Earth, its physical environment, earth materials, and natural resources. The curriculum is offered in a cooperative effort between the Department of Civil and Environmental Engineering and the Department of Geosciences and is specially designed for the student who wishes to build upon the freshman and sophomore mathematics and engineering courses as a basis for studies in the earth sciences.

Geological engineering track requirements provide a foundation in civil and environmental engineering as well as emphasize principles of earth systems, geophysical processes, geochemistry, and biogeochemistry. The engineering design courses are the same as in the environmental engineering track.

The program electives should form a coherent sequence of courses in the student’s area of interest.

This track is accredited by ABET under the civil engineering program requirements.

Geological field experience is most desirable for students interested in the profession. A summer field course is recommended.

Geological engineers examine construction practices on the Princeton campus
CEE Track: Geological Engineering
(ABET Accredited)
Class of 2021

BSE Math & Science Requirements (8 Courses)
CHM 201 General Chemistry I
MAT 103 Calculus
MAT 104 Calculus
MAT 201 Multivariable Calculus,
or MAT 203 Adv. Multivariable Calculus
MAT 202 Linear Algebra w/ Applications,
or MAT 204 Adv. Linear Algebra w/ Applications
PHY 103 General Physics, or PHY 105 Adv. Physics
PHY 104 General Physics, or PHY 106 Adv. Physics
COS 126 General Computer Science

University Writing Seminar (1 Course)
Writing Seminar

Engineering Science Requirements (8 Courses)
CEE 205 Mechanics of Solids _E_
CEE 207 Intro to Environmental Engineering _E_
CEE 302 Practical Models for Environmental Systems
CEE 305 (GEO 375) Environmental Fluid Mechanics _E_
CEE 311 (GEO 311) Global Air Pollution
CEE 306 Hydrology _E_
CEE 308 Environmental Eng. Laboratory _E_ (lab) - Note (a)
or GEO 300 Summer Course in Geologic Field Methods
CEE 365 Soil Mechanics _E_
or CEE 370 (GEO 370) Sedimentology (field course)

The eighth course is selected from the following list:
CEE 360 (GEO 361) - Physics of the Ocean and Atmosphere
GEO 363 Environmental Geochemistry
GEO 366 Current and Future Climate
CCE 417 (GEO 417) - Environmental Microbiology
GEO 418 Environmental Aquatic Geochemistry
CEE 424 (GEO 424) - Sedimentology
GEO 430 Climate and The Terrestrial Biosphere
GEO 441 Computational Geophysics
GEO 470 Environmental Chemistry of Soils
GEO 499 Environmental Change, Poverty and Conflict

Additional Math Requirements (2 courses)
ORF 245 Fundamentals of Eng. Statistics,
or ORF 309 Probability and Stochastic Systems,
or a suitable substitute course.
    This requirement may be waived for students who scored 5 on AP
    STAT.
MAE 305 Mathematics in Engineering 1 _E_

Additional Science Requirements (1 course)
GEO 203 Geology,
or EEB 211 Life on Earth: Chaos and Clockwork of Biological
    Design,
or MOL 214 Introduction to Cellular and Molecular Biology,
or MOL 215 Quantitative Principles in Cell and Molecular Biology
    This requirement may be waived for students who scored 5 on AP
    BIO.

Engineering Design Requirements (2 Courses)
CEE 471 Intro to Water Pollution Technology _E_
CEE 477 Eng. Design for Sustainable Development _E_

Independent Work (2 Courses)
CEE 478 Senior Thesis (Counts as two courses) _2xE_

Program Electives (3 or more) – See list.
1. (engineering) _E_ 
2. (engineering) _E_ 
3. _E_ 

Humanities Electives (7 or more)
1. _E_ 
2. _E_ 
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Freshman Year (2017-2018)

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Sophomore Year (2018-2019)

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Junior Year (2019-2020)

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Senior Year (2020-2021)

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Approved and Recommended Program Electives – Geological Engineering Track

A student’s program electives must provide a coherent sequence in the student’s area of interest. For the geological engineering track, at least two of the program electives must be an engineering course. No more than one program elective can be at the 200 level. The courses listed below are pre-approved. If a student would like to take a program elective not on the list, such as a one-time-only course or a graduate course, the student should make a compelling case for why this is consistent with the student’s educational objectives. Approval is based on agreement from the advisor and the departmental representative.

The bullet (*) indicates courses that are highly recommended for this program track.

**Civil and Environmental Engineering**

Courses in the CEE department that are not part of the current requirements. In particular, the following are recommended for the environmental engineering track:

- CEE 311 Global Air Pollution
- CEE 460 Risk Assessment and Management
- CEE 566 Wind Engineering and Structural Dynamics
- GEO/CEE 423 Dynamic Meteorology

**Other Engineering and Science Departments**

Courses in mechanical engineering, chemical engineering, applied math (APC and ORF), geosciences, biology (EEB), chemistry.
CEE Track: Structural Engineering

Structural engineering is concerned with the analysis and design of civil engineering structures with an emphasis on buildings, bridges, stadiums, dams, and foundations. Particular emphasis is given to the design of these structures to resist earthquake and wind loads.

The program is designed to meet the needs of students who are interested in continuing to advanced graduate studies or who plan to go into engineering practice and consulting. Its basic aim is the preparation of flexible and innovative graduates who can address the novel problems of modern engineering. Students in this program have the chance to directly interact with some of the best design and consulting companies in structural engineering.

Structural engineering track requirements provide a foundation in civil and environmental engineering as well as emphasize engineering design of buildings and bridges.

The Program Electives should form a coherent sequence of courses in the student's area of interest.

This track is accredited by ABET under the civil engineering program requirements.
### CEE Track: Structural Engineering
(ABET Accredited)
Class of 2021

**BSE Math & Science Requirements (8 Courses)**
- CHM 201 General Chemistry I
- MAT 103 Calculus
- MAT 104 Calculus
- CHM 201 Multivariable Calculus,
  - or MAT 203 Adv. Multivariable Calculus
- MAT 202 Linear Algebra w/ Applications,
  - or MAT 204 Adv. Linear Algebra w/ Applications
- PHY 103 General Physics, or PHY 105 Adv. Physics
- PHY 104 General Physics, or PHY 106 Adv. Physics
- COS 126 General Computer Science

**University Writing Seminar (1 Course)**
Writing Seminar

**Engineering Science Requirements (8 Courses)**
- CEE 205 Mechanics of Solids
  - or CEE 262A Structures and the Urban Environment
- CEE 312 Statics of Structures
  - or CEE 361 Structural Analysis & Finite Elements
- CEE 207 Intro to Environmental Engineering
  - or CEE 302 Practical Models for Environmental Systems
- CEE 306 Hydrology
  - or CEE 305 Environmental Fluid Mechanics

Two of the following:
- CEE 364 Materials in Civil Eng. (lab)
  - or CEE 365 Soil Mechanics
- CEE 308 Environmental Eng. Laboratory -- Note (a)

**Additional Math Requirements (2 courses)**
- ORF 245 Fundamentals of Eng. Statistics,
  - or ORF 309 Probability and Stochastic Systems,
  - or a suitable substitute course.
- This requirement may be waived for students who scored 5 on AP STAT.
- MAE 305 Mathematics in Engineering

**Additional Science Requirements (1 course)**
- GEO 203 Geology,
  - or EEB 211 Life on Earth: Chaos and Clockwork of Biological Design,
  - or MOL 214 Introduction to Cellular and Molecular Biology,
  - or MOL 215 Quantitative Principles in Cell and Molecular Biology
  - This requirement may be waived for students who scored 5 on AP BIO.

**Engineering Design Requirements (2 Courses)**
- CEE 366 Design of Reinforced Concrete Structures
  - or CEE 461 Design of Large-Scale Structures: Buildings

**Independent Work (2 Courses)**
- CEE 478 Senior Thesis (Counts as two courses)

**Program Electives (3 or more) – See list.**
- 1. (engineering) F
- 2.
- 3.

**Humanities Electives (7 or more)**
- 1. 5.
- 2. 6.
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### Freshman Year (2017-2018)

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Approved and Recommended Program Electives – Structural Engineering Track

A student’s program electives must provide a coherent sequence in the student’s area of interest. For the structural engineering track, at least one of the program electives must be an engineering course. No more than one program elective can be at the 200 level. The courses listed below are highly recommended for this program track. If a student would like to take a program elective not on the list, such as a one-time-only course or a graduate course, the student should make a compelling case for why this is consistent with the student’s educational objectives. Approval of all program electives, including those on the list below, is based on agreement from the advisor and the departmental representative.

The bullet (*) indicates courses that are highly recommended for this program track.

Civil and Environmental Engineering
Courses in the CEE department that are not part of the current requirements. In particular, the following are recommended for the structures track:
- CEE 376 Independent Study
- CEE 439 Structural Health Monitoring
- CEE 460 Risk Analysis
- CEE 463 A Social and Multi Dimensional Exploration of Structures
- CEE 467 Design and Behavior Steel Structures
- CEE 477 Engineering Design for Sustainable Development
- CEE 540 Special Topics in MMS: Elements of Conceptual Design and Analysis of Structures
- CEE 566 Wind Engineering and Structural Dynamics

Other Engineering and Science Departments
Courses in mechanical engineering, applied math (APC and ORF), and geology. In particular, the following are recommended for the structural engineering track:
- ORF 307 Optimization
- ORF 309 Probability and Stochastic Systems
CEE Track: Engineering and the Liberal Arts

This program is designed for students who wish to obtain an engineering background as a foundation for a wide range of careers, such as medicine, law, public policy, visual arts, or engineering studies in materials, ethics, or history. Coursework in this track should integrate engineering courses in a coherent manner with the topic of interest to the student. The track is designed to be rigorous, yet allow for a wide degree of flexibility in the course of studies.

All students in Engineering and the Liberal Arts must acquire a strong background in mathematics and the basic sciences (8 courses), followed by courses in Engineering Sciences that stress design and analytical methods in Civil and Environmental Engineering (a minimum of 6 courses).

The program electives should form a coherent sequence of courses in the student’s area of interest, and Junior Independent Research is strongly recommended as a program elective. This is followed by the Senior Thesis. In the Junior Independent Research and Senior Thesis students should relate their topics of interest to engineering problems.

Lawyers, politicians, and governmental administrators can better handle their responsibilities when they have a basic understanding of engineering principles relating to public works and potential disasters. CEE faculty and graduate students brought their recent analysis of downtown Manhattan into the public forefront following the disaster of September 11th.
## CEE Track: Engineering and the Liberal Arts
### (Not ABET Accredited)
#### Class of 2021

**BSE Math & Science Requirements (8 courses)**
- CHM 201 General Chemistry I, or
- MAT 103 Calculus
- MAT 104 Calculus
- MAT 201 Multivariable Calculus, or
- MAT 203 Adv. Multivariable Calculus
- MAT 202 Linear Algebra w/ Applications, or
- MAT 204 Adv. Linear Algebra w/ Applications
- PHY 103 General Physics, or PHY 105 Adv. Physics
- PHY 104 General Physics, or PHY 106 Adv. Physics
- COS 126 General Computer Science

**University Writing Seminar (1 Course)**
- Writing Seminar

**Engineering Science Requirements (6 courses)**
(Core Courses)
- A minimum of six CEE courses, of which at least 3 should be the 300 level or above. At least one of the 300-level courses has to have a laboratory component. (Upon approval by the program advisor, this lab requirement may be satisfied by a 300-level course from another department, but is still necessary to take 6 CEE courses)

**Program Electives (7 courses)**
- Seven program electives are required and these should include a coherent sequence of at least four courses in the student’s area of interest, three of which should be the 300 level or above. Collectively, the selection of engineering science requirements and electives should form a coherent program of study, which needs to be approved by the advisor. At least eight of these courses must be the 300 level or above.

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**Independent Work (2 courses)**
- CEE 478 Senior Thesis (Counts as two courses)

**Humanities Electives (7 or more)**

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* "E_" indicates engineering course, which counts toward the ABET requirement of 1.5 years of engineering topics.
Civil Engineering ABET Program Compliance

This form, together with the online degree-progress report, summarizes how a student’s course of study satisfies the requirements for a BSE degree from the Department of Civil and Environmental Engineering and is compliant with ABET requirements for civil engineering programs. This form includes only those ABET requirements that are not directly apparent from looking at the degree progress report.

<table>
<thead>
<tr>
<th>Student Name</th>
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List the ENGINEERING courses that you have taken -- minimum fourteen required.
ABET requires “1.5 years of engineering topics”, which is that 37.5% of a four year program. This corresponds to 14 out of the required 36 courses. For this purpose, we include MAE 305, but not ORF 245.

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☐ At least one course in a minimum of four technical areas of civil engineering.

Circle the courses you took that satisfy these technical areas:

- Environmental
  - CEE 207
  - CEE 302
  - CEE 308
  - CEE 311

- Geotechnical
  - CEE 365
  - CEE 424
  - CEE 460

- Hydrology
  - CEE 305
  - CEE 306

- Materials
  - CEE 364

- Structures
  - CEE 205
  - CEE 312
  - CEE 361

☐ Laboratory courses in which students conduct civil engineering experiments and analyze and interpret data.

Circle the courses you took that satisfy this requirement:

- Environmental
  - CEE 308

- Geotechnical
  - CEE 370
  - GEO 300

- Materials
  - CEE 364

Advisor name, signature and date:

__________________________

Departmental representative name, signature and date:

__________________________

Prof. Branko Glisic