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University of Washington



# Civil & Environmental Engineering

## ADVISING HANDBOOK

2009–2010

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# Welcome!

## For Students

Welcome to the Department of Civil and Environmental Engineering! You are joining a proud department with a long history that dates back over a hundred years at the University of Washington. The CEE faculty and staff welcome you as you embark on your pursuit of the Bachelor of Science in Civil Engineering (BSCE).

The Advising Handbook is intended as a resource to help you familiarize yourself with the BSCE program, our department, and your “next-steps” as you pursue the BSCE degree.

The CEE undergraduate adviser will help you navigate through the academic degree requirements and regulations, and processes. You will be assisted by faculty mentor(s) who will help you to select appropriate senior-year courses given your engineering interests and goals, and guide you in your preparation towards future employment or graduate study.

## For Faculty Mentors

Thank you for serving as a faculty mentor for our undergraduate students! As a *faculty mentor*, you provide students with insight and guidance for preparation and entry into the civil and environmental engineering field. You can help students to identify and explore their areas of interests and to select senior-year coursework that support their professional and/or academic goals.

You are *not* responsible for understanding University regulations and academic requirements in detail. Students are encouraged to work with the CEE undergraduate adviser to ensure progress towards degree.

The Advising Handbook is always a work in progress if it is to remain current. Your feedback and suggestions are always welcomed.

*If you ever have questions or concern, please feel free to contact the CEE undergraduate adviser (Mariko Navin) at [ceavice@u.washington.edu](mailto:ceavice@u.washington.edu), or 206-543-5092, or simply drop by More Hall 201. We look forward to working with you!*

## HELPFUL RESOURCES

UW Academic Calendar	<a href="http://www.washington.edu/students/reg/calendar.html">www.washington.edu/students/reg/calendar.html</a>
UW Time Schedule	<a href="http://www.washington.edu/students/timeschd">www.washington.edu/students/timeschd</a>
UW Course Catalog	<a href="http://www.washington.edu/students/crscat">www.washington.edu/students/crscat</a>
CEE Student Resources	<a href="http://www.ce.washington.edu/resources/students/course_info/students.html">www.ce.washington.edu/resources/students/course_info/students.html</a>
CEE Projected Course Offering Schedule	<a href="http://www.ce.washington.edu/resources/faculty/coursetimes/time_schedules.html">www.ce.washington.edu/resources/faculty/coursetimes/time_schedules.html</a>
Engineering Advising and Diversity Center	<a href="http://www.engr.washington.edu/eadc">www.engr.washington.edu/eadc</a>
UW Admissions	<a href="http://www.admit.washington.edu">www.admit.washington.edu</a>
UW Course Equivalencies for WA St. Community Colleges	<a href="http://www.washington.edu/students/uga/tr/planning/ccequivguide">www.washington.edu/students/uga/tr/planning/ccequivguide</a>
WA State Dept. of Licensing (FE Exam registration)	<a href="http://www.dol.wa.gov/business/engineerslandsurveyors/index.html">www.dol.wa.gov/business/engineerslandsurveyors/index.html</a>
NCEES (FE exam study guide)	<a href="http://www.ncees.org/exams/fundamentals">www.ncees.org/exams/fundamentals</a>

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*The CEE Advising Handbook is also available online at the CEE Student Resources Webpage in HTML and PDF formats.*

## The Bachelor of Science in Civil Engineering

### About Our Department

Civil engineering was officially recognized as an academic discipline at the University of Washington in 1898 and granted its first bachelor's degree in 1901. Since then, the UW Department of Civil & Environmental Engineering (CEE) has graduated over 6,000 undergraduate and 3,300 graduate students. The Department currently offers the following degrees\*:

Bachelor of Science in Civil Engineering (B.S.C.E.)  
Master of Science in Civil Engineering (M.S.C.E.)  
Master of Science in Engineering (M.S.E.)  
Master of Science (M.S.)  
Doctorate of Philosophy (Ph.D.)

*\* The Department also offers, in collaboration with the Department of Construction Management in the College of Architecture and Urban Planning, an online masters degree in Construction Engineering.*

The BSCE degree is accredited by the Engineering Accreditation Commission of ABET (Accreditation Board for Engineering and Technology, 111 Market Place, Suite 1050, Baltimore, MD 21202-4012, Tel: 410-347-7700). The BSCE program at the UW attracts a wide range of prospective students from the state as well as from across the nation and internationally. Majors are admitted only once a year in autumn quarter, and admission is competitive. The Department enjoys exceptionally high retention and graduation rates of approximately 96%.

The BSCE program provides excellent preparation for students entering the civil & environmental engineering field as well for those pursuing graduate education. The quality of the BSCE program is reflected in the high passage rate for our students in the Fundamentals of Engineering (FE) examination (approximately 91%) that results in the Engineer-in-Training (EIT) licensure and in the strong placement of our students in industry and in their admission to prestigious graduate programs.

The Department enjoys national-ranking among civil and environmental engineering programs. The Department currently has approximately 220 undergraduate students, 200 graduate students, 35 faculty and 21 staff.

The Department's area of focus includes construction, structural, transportation, geotechnical, water resources/hydrology/hydraulics, and environmental engineering. It enjoys annual research funding of approximately 12 million dollars. Undergraduates and graduate students participate in faculty research, often working through many of their projects in the Department's many research labs and centers. The Department occupies four buildings: Wilcox, Wilson Ceramics, Roberts Annex, and More Hall, which serves as the department center and houses administrative and student services.

## Overview of the Bachelor of Science in Civil Engineering Major

All new undergraduate majors attend a New Majors Orientation in September prior to the start of the autumn quarter. This orientation provides a broad introduction to the CEE Department and the BSCE degree and highlights academic and extracurricular activities and opportunities for majors. It also provides an opportunity for students to meet current student leaders, faculty, and staff.

Each new major will register for appropriate autumn quarter courses, under the guidance of the CEE undergraduate adviser. Students typically enter the CEE department after completion of the program prerequisites and University general education requirements. During their first-year in the major (CEE “junior” year), students complete thirteen 300-level CEE courses that comprise the core fundamentals of civil & environmental engineering. *(Student admitted to the program “conditionally” pending the completion of a prerequisite or a required course must register for deficient courses the first quarter in the program. Conditional admission students are strongly advised to meet with the undergraduate adviser upon entering the program to develop an individualized graduation plan.)*

*CEE junior year*

During their second-year in the major (CEE “senior” year), students complete program requirements that include Professional Practice (CEE 440), Technical Electives, Upper-Division Engineering and Science Electives, and a Capstone Design course in the area of the student’s engineering interest (CEE 441, 442, 444, or 445). Students select courses in their senior year under the guidance of faculty mentors, who will help students to prepare for their area(s) of civil/environmental engineering interests (for example, construction, transportation, geotechnical, environmental engineering, etc.) or plan for a well-rounded general program in civil/environmental engineering. In the spring quarter of the CEE junior year, students should look for announcements on “faculty mentoring” (also called “senior-year planning”) meetings, where faculty from the different CEE engineering areas meet with students to provide insights and guidance for preparation in to their field. Faculty mentors also help students to select appropriate senior year courses to prepare for employment and/or graduate study. Be sure to submit a copy of your “senior-year plan” sheet to the CEE advising office for your academic file. (For more information on major events in the program, see Academic Timeline, page 39.)

*Faculty Mentors help plan for CEE senior year courses*

The culminating event of the senior year will be the Capstone Design course. Students typically select a capstone course in their area of interest – CEE 441 (Transportation/Construction), CEE 442 (Structural/Geotech), CEE 444 (Water Resources/Hydraulics), and CEE 445 (Environmental). Students work in small groups as “consultants” to external groups or agencies faced with real problems. Students apply the knowledge and skills acquired in the BSCE program to address the engineering problems and concerns that their “clients” face and make formal written and oral presentations.

*Capstone Course*

Qualified students may pursue an Honors Program within the Department. Students who have participated in the University’s College Honors Program beginning in their freshman year and who have complete the University Honors general education requirements may enroll in the College Honors Program to graduate with “College Honors.” Students who wish to enter the Honors Program once admitted to the BSCE degree program may enroll in the Departmental Honors Program to graduate “With Distinction.” Generally, students will need a 3.3 cumulative GPA and a 3.45 CEE departmental GPA. Honors students complete 9 credits of Honors Engineering coursework in addition to other required courses. More information regarding Honors Programs is available online at the University Honor Program and CEE Student Resources Websites.

*Honors Program*

All CEE students are encouraged to participate in active learning through internships, independent research or participation in faculty-sponsored research projects, and involvement in extracurricular activities through student societies and professional organizations. Participation in student and professional societies, such as American Society of Civil Engineers (ASCE) and Chi Epsilon (engineering honor society) and competitions, such as the “Concrete Canoe” and “Steel Bridge” provide excellent opportunities for student involvement.

*Experiential Learning*

## The Bachelor of Science in Civil Engineering (BSCE): An Overview

Listed below and on the facing page are the requirements for the BSCE degree. Ideally, a new major entering the BSCE program will have completed all of the program admissions requirements (prerequisites) and most of the general education requirements prior to admission to the Department.

**Program Prerequisites:** All courses marked with the black diamond (◆) below are prerequisites for the BSCE degree program. Students should have completed these requirements prior to entry into the program.

**Graduation Requirements:** Courses listed without the diamonds, as well as the University General Education Requirements, are graduation requirements. They may be completed at anytime prior to graduation.

Students who, due to extenuating circumstances, were unable to complete one or two prerequisite courses may have been admitted conditionally. **Conditional admission students should work with the undergraduate adviser to work out a graduation plan that ensures the timely completion of missing courses.**

### PREPARATORY COURSES

#### Mathematics **24 cr**

- ◆ MATH 124 Calc/Analytic Geom I (5)
- ◆ MATH 125 Calc/Analytic Geom II (5)
- ◆ MATH 126 Calc/Analytic Geom III (5)
- MATH 307 Differential Equations (3)
- ◆ MATH 308 or 318 Matrix Algebra (3)
- Statistics: IND E 315\* (3) (preferred)  
or STAT 390 (4) or 300-level or higher  
math. (See note below in Engineering Fundamentals)

#### Physics **15 cr**

- ◆ PHYS 121 Mechanics (5)
- ◆ PHYS 122 Elect-Mag & Osc (5)
- PHYS 123 Waves (5)

#### Chemistry **10 cr**

- ◆ CHEM 142 General Chemistry (5)
- CHEM 152 General Chemistry (5)

#### Engineering Fundamentals **19 cr**

- ◆ AMATH 301 Beg Scientific Computing (4)  
or CSE 142 Computer Programming I (4)
- ◆ AA 210 Statics (4)
- ◆ CEE 220 Mechanics of Materials (4)
- ◆ ME 230 Kinematics & Dynamics (4)
- One course from: ME 123, MSE 170, EE 215, IND E 250, CHEM E 260, IND E 280.  
(Students may take IND E 315 for the Engineering Fundamentals and apply any non-statistics, 300-level MATH course, except MATH 354 and 355, towards the mathematics requirement.)

### UNIVERSITY GENERAL EDUCATION COURSES

#### Written Communication **12 cr**

- ◆ English Composition (5)
- HCDE 231 Intro to Technical Writing (3)
- CEE 363 (W) Satisfied by major coursework (4)

#### Economics **CEE topic requirement**

ECON 200 or 201 (5) or IND E 250 (4)

#### Individuals & Society (I&S) **10 cr**

I&S electives selected from University list.  
ECON 200 counts towards above and as I&S.

#### Visual, Literary, Perf Arts (VLPA) **10 cr**

VLPA electives selected from University list.  
(ME 123 satisfies VLPA as well as Engr Fund elective.)

#### Additional VLPA or I&S **4 cr**

#### General Electives

(to bring the balance of credits up to the minimum 180 credits required for a bachelor's degree.)

#### NOTES:

- ◆ Prerequisite courses required for admission to the major.
- IND E 315 may be counted as either a Math class or Engineering Fundamentals, but not both.
- The BSCE degree does not have a foreign language graduation requirement.

## Program Requirements and Sample Schedule

Listed below are courses students typically take once admitted to the major.

First-year majors (CEE “juniors”) enroll in required 300-level course as Track I or II. (See Model Schedule for more information.) The CEE “senior” or second year allows students flexibility to complete core technical requirements, explore areas of their own interest, and engage in a capstone design course of their choice requirements.

### COURSES WITHIN THE CEE MAJOR

**CEE “Junior” (1<sup>st</sup> year) Courses 45 cr**

- CEE 306 Construction Engr I (3)
- CEE 316 Surveying (4)
- CEE 320 Transportation Engr (3)
- CEE 342 Fluid Mechanics (4)
- CEE 345 Hydraulic Engr (4)
- CEE 350 Environmental Engr I (4)
- CEE 360 Sustainability in Engineering (3)
- CEE 363 Construction Materials (4)
- CEE 366 Basic Soil Mechanics (4)
- CEE 379 Elem. Structures I (4)
- CEE 380 Elem Structures II (4)
- CEE 391 Autocad (3)
- CEE 392 Basic CE Computing/MatLab (1)

**CEE “Senior” (2<sup>nd</sup> year) Courses:**

**Professional Practice and Capstone 6 cr**

- CEE 440 Professional Practice (2)
- Capstone Design Course (4)
- Choose one:
- CEE 441 Transportation & Construction Capstone
- CEE 442 Structural Geotechnical Capstone
- CEE 444 Water Resources/Hydraulics Capstone
- CEE 445 Environmental Engineering Capstone

**Technical Electives 15 cr**

Students must take at least one course from four of the six different area selected from the “Core Courses” list (List A), plus any additional CEE 400-level courses not used elsewhere.

**Upper-Division Engineering and Science 9 cr**

Choice of additional CEE 400-level courses (excluding CEE 423) and courses from an approved list of courses outside the department. See Upper-Division course list (List B, available on CE Web site).

### SAMPLE 4-YEAR PLAN

**Sample Freshman Year**

Autumn		Winter		Spring	
MATH 124	5	MATH 125	5	MATH 126	5
CHEM 142	5	CHEM 152	5	PHYS 121	5
ENGL Comp	5	VLPA/IS	5	VLPA/IS	5
		CEE 100	1		
Total	15	Total	16	Total	15

**Sample Sophomore Year**

Autumn		Winter		Spring	
MATH 307	3	MATH 308	3	IND E 315	3
PHY 122	5	PHYS 123	5	Engr Fund	4
AA 210	4	CEE 220	4	ME 230	4
ECON 200	5	HCDE 231	3	VLPA/IS (or AMATH 301)	4
Total	16	Total	15	Total	15

**Sample CEE Junior Year (Students take Track I or II)**

Autumn		Winter		Spring	
<i>Track I</i>					
CEE 306	3	CEE 342	4	CEE 345	4
CEE 316	4	CEE 350	4	CEE 360	4
CEE 320	3	CEE 379	4	CEE 366	4
CEE 363 W	4	CEE 391	3	CEE 380	4
CEE 392	1				
Total	15	Total	14	Total	16
<i>Track II</i>					
CEE 306	3	CEE 345	4	CEE 320	3
CEE 316	4	CEE 350	4	CEE 360	4
CEE 342	4	CEE 366	4	CEE 363W	4
CEE 379	4	CEE 380	4	CEE 391	3
CEE 392	1				
Total	16	Total	15	Total	14

**Sample CEE Senior Year**

Autumn		Winter		Spring	
CEE 440	2	Tech Elec	3	Capstone	4
Tech Elec	3	Tech Elec	3	Tech Elec	3
Tech Elec	3	UD Elective	3	Tech Elec	3
UD Elective	3	VLPA/IS	5	UD Elective	3
Electives		<i>Additional credits as desired or needed</i>			

## Senior Year Course Work

Students should meet with their faculty mentors in the spring quarter of their junior year to discuss course selection for their senior year based on their interests and future aspirations. Students will complete the senior year "Plan Sheet" with their faculty mentors and submit a copy to the CEE Advising Office (More Hall 201 or via [ceadvice@u.washington.edu](mailto:ceadvice@u.washington.edu).)

During the senior year, students will take CEE 440 Professional Practice (Autumn Quarter), Technical Electives (15 credits), Upper-Division Engineering and Science Electives (9 credits) and a Design Capstone course (one of CEE 441, 442, 444, or 445) according to their areas of interest.

### **Technical Electives – "Core Courses" (List A)**

*To satisfy Technical Electives requirements, students must select at least one class from four of the six areas shown on the right (List A). These four core courses must be completed with a minimum grade of 2.0.*

*The additional fifth course may be selected from this list or from any of the 400-level CEE courses, except CEE 423. The minimum grade for this fifth course may be completed with a minimum grade of 1.0.*

### **Upper-Division Engineering and Science Electives**

*To satisfy the Upper-Division Engineering & Science Electives, students may take any 400-level CEE course (except CEE 423) or approved courses from outside of the CEE Department. For outside-department courses, students may select courses from the pre-approved list (List B) or petition a course not on the list to be approved for Upper-Division Engineering and Science Elective.*

*For more information, see page 27.*

### **TECHNICAL ELECTIVES: CORE COURSES (LIST A)**

#### **Construction Core**

- CEE 404 Infrastructure Construction (4)
- CEE 421 Pavement Design (3)
- CEE 425 Reinforced Concrete Construction (3)

#### **Transportation Core**

- CEE 410 Traffic Engr Fundamentals (3)
- CEE 412 Trans Data Mgmt (3)
- CEE 416 Urban Trans Planning Design (3)

#### **Geotechnical Core**

- CEE 436 Foundation Design (3)
- CEE 437 Engineering Geology (3)

#### **Structural core**

- CEE 451 Design of Metal Structures (3)
- CEE 452 Design Reinforced Concrete Structures (3)
- CEE 453 Prestressed Concrete Design (3)
- CEE 454 Design Timber Structures (3)
- CEE 455 Structural Unit Masonry (3)
- CEE 457 Advanced Structures I (3)

#### **Water Core**

- CEE 474 Hydraulics of Sediment Transp (3)
- CEE 475 Analysis Techniques for Groundwater Flow (3)
- CEE 476 Physical Hydrology (3)
- CEE 477 Open-Channel Engr (3)

#### **Environmental Core**

- CEE 462 Applied Limnology and Pollutant Effects on  
Freshwater (3) NW
- CEE 480 Air-Quality Modeling (3)
- CEE 481 Hydraulic Design for Env'l Engr (3)
- CEE 482 Wastewater Treatmt & Reuse (3)
- CEE 483 Drinking Water Treatment (3)
- CEE 484 Decentralized & On-Site Wastewater Mgmt &  
Reuse (3)
- CEE 490 Air-Pollution Control (4)

## Recommended Coursework for Seniors

Civil Engineering is a broad field encompassing many diverse yet related topics. The practice of civil engineering requires proficiency in many of these topics, and civil engineers often find that their technical interests and opportunities over the course of their careers. In view of the interdisciplinary nature of the field, you are encouraged to pursue a course of study which offers the breadth necessary for your future professional development. If you have a defined interest in one or more areas of civil engineering, you may want to select elective undergraduate courses which emphasize your interest or you may want to consider pursuing them in detail at the graduate level. Following you will find groupings of senior courses which we hope will aid you in your selection:

### GENERAL CIVIL ENGINEERING

The general civil engineering course suggestions will give you a broad background in civil engineering at the undergraduate level. You may anticipate careers in consulting firms, or in local, state, or federal agencies. This choice of course work provides suitable background for general professional practice or for graduate study in any branch of civil engineering.

#### Required Course:

CEE 440 Professional Practice Studio (2)

#### Strong Recommend Courses

CEE 416 Urban Transportation Planning and Design (3)  
 CEE 451 Design of Metal Structures (3)  
 CEE 452 Design of Reinforced Concrete Structures (3)  
 CEE 436 Foundation Design (3)  
 CEE 481 Hydraulic Design for Environmental Engineering (3)  
 CEE 483 Wastewater Treatment and Reuse (3)

#### Recommended Courses

CEE 404 Infrastructure Construction (4)  
 CEE 421 Pavement Design (3)  
 CEE 424 GIS for Civil Engineers (3)  
 CEE 476 Physical Hydrology (3)  
 CEE 477 Open Channel Engineering (3)  
 CEE 484 On-Site Water Disposal (3)

#### Suggested Courses:

CEE 410 Traffic Engineering Fundamentals (3)  
 CEE 425 Reinforced Concrete Construction (3)  
 CEE 454 Design of Timber Structures (3)  
 CEE 473 Coastal Engineering (3)

#### Other Courses of Interest:

### GENERAL CIVIL ENGINEERING

### **PLAN AHEAD FOR A MINOR!**

Popular minors for CEE majors include **Math** and **Architectural Studies**. For more information on minors, see:

- General Catalog [www.washington.edu/students/gencat/](http://www.washington.edu/students/gencat/)
- Minors Website [www.washington.edu/students/ugrad/advising/majmenu.html#minors](http://www.washington.edu/students/ugrad/advising/majmenu.html#minors)

## Recommended Coursework for Seniors

### CONSTRUCTION ENGINEERING

#### FOR STUDENTS INTERESTED IN CONSTRUCTION ENGINEERING

The suggested courses will help you prepare for entry level positions in the construction industry or with agencies or firms that require a construction specialty. The construction engineering specialty in CEE is strongly linked to transportation engineering; hence the CEE 410 and 416 courses shown below. Employment for specific positions in construction will also depend on the extent of your construction related experience and the specific types of projects being constructed, for example, buildings, highways, power plants, dams, and airports—to name a few. Included in the courses listed below are several from the Department of Construction Management (CM); however, note that preference is given to CM students taking CM courses. Thus, admission to CM courses cannot be assured.

*This is a general guide. Please consult your faculty mentor for more information.*

#### Required Courses

CEE 440 Professional Practice Studio (2)

#### Strongly Recommended Courses

CEE 404 Infrastructure Construction (4)  
 CEE 410 Traffic Engineering Fundamentals (3)  
 CEE 416 Urban Transportation Planning and Design (3)  
 CEE 421 Pavement Design (3)  
 CM 421 Project Management (3)  
 CEE 425 Reinforced Concrete Construction (3)  
 CEE 441 Transportation and Construction Capstone (4)

#### Recommended Courses

CEE 436 Foundation Design (3)  
 CEE 452 Design of Reinforced Concrete Structures (3)  
 CEE 454 Design of Timber Structures (3)  
 CEE 477 Open-Channel Engineering (3)  
 CEE 424 GIS for Civil Engineers (3)  
 CEE 495 Design for the Environment (3)

#### Recommended Outside Department Courses

CM 411 Project Planning and Control (3)  
 CM 420 Temporary Structures (3)  
 CM 422 Lab course for CM 411 (2)

#### Others:

*The CM Department holds its annual career fair in November.*

*CEE students are welcomed to attend!*

*To request add codes for CM courses or for more information on CM courses, please contact:*

Department of Construction Management  
 College of Architecture and Urban Planning  
 120 Architecture Building, Box 351610  
<http://depts.washington.edu/cmweb/>  
[uwcm@u.washington.edu](mailto:uwcm@u.washington.edu)  
 206-543-6377

## Recommended Coursework for Seniors

### FOR STUDENTS INTERESTED IN TRANSPORTATION ENGINEERING

The suggested courses provide a balanced offering of transportation engineering courses and can provide a basis for proceeding into professional practice or continuing on to graduate school. The selected courses recognize that in the future it will be very difficult to plan, design and construct transportation facilities without knowledge of both transportation and construction topics therefore we are there emphasizing that a blended program be considered.

*This is a general guide. Please consult your faculty mentor for more information.*

#### Required Courses

CEE 440 Professional Practice Studio (2)

#### Strongly Recommended Courses

CEE 410 Traffic Engineering Fundamentals (3)  
 CEE 412 Transportation Data Management (3)  
 CEE 416 Urban Transportation Planning and Design (3)  
 CEE 441 Transportation and Construction Capstone (4)  
 CEE 498 Special Topic: Transportation Logistics (3)  
 CEE 498 Special Topics: Transportation Simulation (3)

#### Recommended Courses

CEE 404 Infrastructure Construction (3)  
 CEE 421 Pavement Design (3)  
 CEE 424 GIS for Civil Engineers (3)  
 CEE 495 Sustainability Design for the Environment (3)

*Others:*

TRANSPORTATION  
ENGINEERING

*Transportation engineers are highly in demand in the Puget Sound region and across the country!*

*Transportation Northwest (TransNow), located in More Hall 129, offers numerous internship opportunities with full-tuition scholarships. For more information, see [www.transnow.org](http://www.transnow.org).*

## Recommended Coursework for Seniors

### GEOTECHNICAL ENGINEERING

#### FOR STUDENTS INTERESTED IN GEOTECHNICAL ENGINEERING

Geotechnical engineering involves the study of soil and rock as engineering materials. It is an interdisciplinary field, drawing on other disciplines such as geology, mechanics, hydrology, structural engineering, seismology, construction, and environmental engineering. Among other things, geotechnical engineers design foundations, and dams, evaluate landslides potential and earthquake hazards, and remediate contaminated sites. Geotechnical engineers work for small and large consulting firms, government agencies, and large design firms.

*This is a general guide. Please consult your faculty mentor for more information.*

#### Required

CEE 440 Professional Practice Studio (2)

#### Strongly Recommended

CEE 431 Seismology and Earthquake Engineering (3)

CEE 436 Foundation Design (3)

CEE 437 Engineering Geology (3)

CEE 442 Structural Geotechnical Capstone Design Project (4)

CEE 452 Design of Reinforced Concrete Structures (3)

#### Recommended Courses

CEE 421 Pavement Design (3)

CEE 451 Design of Metal Structures (3)

CEE 475 Analysis Techniques for Groundwater Flow (3)

#### Suggested Courses:

CEE 457 Advanced Structures I (3)

CEE 477 Open-Channel Engineering (3)

CEE 482 Water and Wastewater Treatment (3)

#### Suggested Courses from Outside Departments

STAT 390 Probability and Statistics for Engineers & Scientists (4)

ESS 210 Physical Geology (5) NW \* prerequisite for CEE 437

ESS 326 Geomorphology (5)

*See also other Earth & Space Science (ESS) courses.*

## Recommended Coursework for Seniors

### FOR STUDENTS INTERESTED IN STRUCTURAL ENGINEERING

The Structures and Mechanics area of emphasis deals with the strength of structures and their response to physical loads. The discipline typically leads to jobs in consulting engineering (designing building structures, bridges, etc.) or in contracting (concerned with the process and fabrication and erection rather than design of the structure). Many students also go on to study structures and mechanics at the graduate level, perhaps specializing further into earthquake engineering, long-span structures, etc.

**STRUCTURAL  
ENGINEERING**

*This is a general guide. Please consult your faculty mentor for more information.*

#### Required

CEE 440 Professional Practice Studio (2)

#### Strongly Recommended

CEE 436 Foundation Design (3)  
 CEE 442 Structural Geotechnical Engineering Capstone Design Project (4)  
 CEE 451 Design of Metal Structures (3)  
 CEE 452 Design of Reinforced Concrete Structures (3)  
 CEE 457 Advanced Structures I (3)

#### Recommended Courses

CEE 431 Seismology and Earthquake Engineering (3)  
 CEE 453 Prestressed Concrete (3)  
 CEE 454 Design of Timber Structures (3)  
 CEE 455 Structural Unit Masonry (3)  
 CEE 458 Advanced Structures II (3)  
 CEE 459 Advanced Structural Mechanics (3)

#### Suggested Courses:

CEE 421 Pavement Design (3)  
 CEE 437 Engineering Geology I (3)  
 CEE 473 Coastal Engineering (3)  
 CEE 477 Open-Channel Engineering (3)  
 CEE 481 Hydraulic Design for Environmental Engineering (3)  
 CEE 491 Deterministic Systems (3)

#### Courses of Interest:

CEE 476 Physical Hydrology (3)  
 CEE 492 Stochastic Systems (3)

## Recommended Coursework for Seniors

### WATER RESOURCES, HYDRAULICS AND HYDROLOGY ENGINEERING

#### FOR STUDENTS INTERESTED IN WATER RESOURCES, HYDRAULICS, HYDROLOGY ENGINEERING

Water resources, hydraulics and hydrology engineering encompass the planning, design, and operation of water projects. The courses listed below present information in the fields of hydraulics and fluid mechanics, surface and groundwater hydrology, coastal engineering and the computer modeling of water resource systems. Graduates with a background in these areas find employment in both the private and public sectors. The courses also provide background for graduate study.

*This is a general guide. Please consult your faculty mentor for more information.*

#### Required

CEE 440 Professional Practice Studio (2)

#### Strongly Recommended

CEE 444 Water Resources & Hydraulic Engr Capstone Design Project (3)  
 CEE 476 Physical Hydrology (3)  
 CEE 477 Open-Channel Engineering (3)  
 CEE 481 Hydraulic Design fro Environmental Engineering (3)

#### Recommended Courses

CEE 436 Foundation Design (3)  
 CEE 437 Engineering Geology I (3)  
 CEE 472 Introduction to Hydraulics in Water Resources (3)  
 CEE 473 Coastal Engineering (3)  
 CEE 474 Hydraulics of Sediment Transport (3)  
 CEE 475 Analysis Techniques for Groundwater Flow (3)  
 CEE 491 Deterministic Systems (3)

#### Suggested Courses:

CEE 425 Reinforced Concrete Construction (3)  
 CEE 452 Design of Reinforced Concrete Structures (3)  
 CEE 492 Stochastic Systems (3)

#### Suggested Courses from Outside Departments

ECON435 Natural Resource Economics (prereq: ECON 200) (5)  
 ESS 426 Fluvial Geomorphology (5)  
 ESS 427 Hillslope Geomorphology (5)

#### Others:

## Recommended Coursework for Seniors

### FOR STUDENTS INTERESTED IN ENVIRONMENTAL ENGINEERING

If you choose to concentrate in environmental engineering you may wish to emphasize water or air-related courses. The courses below are intended to prepare you for employment with consulting firms, public agencies and industries. Employment is available in many related fields of pollution control, public works, sanitary or environmental engineering, solid waste and hazardous wastes engineering, and water and air quality management. The courses selections are also intended to provide background for graduate study in these areas.

### ENVIRONMENTAL ENGINEERING

*This is a general guide. Please consult your faculty mentor for more information.*

#### Required

CEE 440 Professional Practice Studio (2)

#### Strongly Recommended

CEE 445 Environmental Engineering Capstone Design Project (3)  
 CEE 476 Physical Hydrology (3)  
 CEE 481 Hydraulic Design for Environmental Engineering (3)  
 CEE 482 Wastewater Treatment and Reuse (3)  
 CEE 483 Drinking Water Treatment (3)

#### Recommended Courses

CEE 462 Applied Limnology and Pollutant Effects on Freshwater (3)  
 CEE 463 Limnology Lab (2)  
 CEE 484 On-Site Wastewater Treatment (3)  
 CEE 485 Aquatic Chemistry (3)  
 CEE 475 Analysis Technology for Ground Water Flow (3)  
 CEE 474 Hydraulics of Sediment Transport (3)  
 CEE 477 Open-Channel Engineering (3)

#### Recommended Courses for Those Interested in Air Pollution:

CEE 490 Air Pollution Control (4)  
 CEE 480 Air Quality Modeling (3)  
 CEE 493 Air Pollution Source Test (3)  
 CEE 494 Air Pollution Control Equipment Design (3)

*Others:*

## Course Descriptions: Prerequisite Courses

◆ Admission requirement.

A minimum grade of 2.0 is required for all program prerequisites.

A minimum grade of 1.0 is required for courses used to satisfy CEE major graduation requirements.

### MATHEMATICS (Min. 24 credits)

#### ◆ MATH 124 Calculus with Analytic Geometry I (5) NW

First quarter in calculus of functions of a single variable. Emphasizes differential calculus. Emphasizes applications and problem solving using the tools of calculus. Prerequisite: 2.5 in MATH 120, score of 68% on MATHPC placement test, score of 75% on MATHEC placement test, or score of 2 on AP test. Offered: AWSpS.

#### ◆ MATH 125 Calculus with Analytic Geometry II (5) NW

Second quarter in the calculus of functions of a single variable. Emphasizes integral calculus. Emphasizes applications and problem solving using the tools of calculus. Prerequisite: either 2.0 in MATH 124, score of 3 on AB advanced placement test, or score of 3 on BC advanced placement test. Offered: AWSpS.

#### ◆ MATH 126 Calculus with Analytic Geometry III (5) NW

Third quarter in calculus sequence. Introduction to Taylor polynomials and Taylor series, vector geometry in three dimensions, introduction to multivariable differential calculus, double integrals in Cartesian and polar coordinates. Prerequisite: either 2.0 in MATH 125, 2.0 in MATH 145, 2.0 in MATH 146, score of 5 on AB advanced placement test, or score of 4 on BC advanced placement test. Offered: AWSpS.

#### MATH 307 Introduction to Differential Equations (3) NW

Introductory course in ordinary differential equations. Includes first- and second-order equations and Laplace transform. Prerequisite: either 2.0 in MATH 125 or 2.0 in MATH145. Offered: AWSpS.

#### ◆ MATH 308 Matrix Algebra with Applications (3) NW

Systems of linear equations, vector spaces, matrices, subspaces, orthogonality, least squares, eigenvalues, eigenvectors, applications. For students in engineering, mathematics, and the sciences. Credit allowed for only one of MATH 308 or MATH 318. Prerequisite: either 2.0 in MATH 126 or 2.0 in MATH 146. Offered: AWSpS.

**One of IND E 315 or STAT 390:**  
(See note below)

#### IND E 315 Probability and Statistics for Engineers (3) NW

Application of probability theory and statistics to engineering problems, distribution theory and discussion of particular distributions of interest in engineering, statistical estimation and data analysis. Illustrative statistical applications may include quality control, linear regression, and analysis of engineering data sets. Prerequisite: either MATH 136 or MATH 307. Offered: AWSpS.

#### STAT 390 Probability and Statistics in Engineering and Science (4) NW

Concepts of probability and statistics. Conditional probability, independence, random variables, distribution functions. Descriptive statistics, transformations, sampling errors, confidence intervals, least squares and maximum likelihood. Exploratory data analysis and interactive computing. Students may receive credit for only one of 390, STAT/ECON 481, and ECON 580. Prerequisite: either MATH 126 or MATH 136. Offered: jointly with MATH 390; AWSpS.

#### ALSO ACCEPTED:

- CHEM 144 series in place of CHEM 142-152
- MATH 134-135-136 Accelerated [Honors] Calculus (5 each) - Covers the material of MATH 124, 125, 126; 307, 308, 318.
- AMATH 351 Intro to Differential Equations and Applications (3) accepted in place of MATH 307
- AMATH 352 Applied Linear Algebra and Numerical Analysis (3) accepted in place of MATH 308.

#### NOTE:

**IND E 315 may not be used to satisfy both Mathematics and Engineering Fundamentals requirements.** However, students who take IND E 315 as an Engineering Fundamental (see page 19) may apply any non-statistics, 300-level MATH course, except MATH 354 and 355, towards the mathematics requirement.

## Course Descriptions: Prerequisite Courses

### PHYSICS (15 credits)

#### ◆ PHYS 121 Mechanics (0/5, max. 5) NW, QSR

Basic principles of mechanics and experiments in mechanics for physical science and engineering majors. Lecture tutorial and lab components must all be taken to receive credit. Credit is not given for both 114 and 121. Prerequisite: MATH 124, MATH 127, MATH 134, or MATH 145, any of which may be taken concurrently; recommended: one year high school physics. Offered: AWSpS.

#### ◆ PHYS 122 Electromagnetism and Oscillatory Motion (0/5, max. 5) NW

Basic principles of electromagnetism, the mechanics of oscillatory motion, and experiments in these topics for physical science and engineering majors. Lecture tutorial and lab components must all be taken to receive credit. Credit is not given for both 115 and 122. Prerequisite: MATH 125, MATH 128, MATH 134, or MATH 146, any of which may be taken concurrently; PHYS 121. Offered: AWSpS.

#### PHYS 123 Waves (0/5, max. 5) NW

Electromagnetic waves, optics, waves in matter, and experiments in these topics for physical science and engineering majors. Lecture tutorial and lab components must all be taken to receive credit. Credit is not given for both 116 and 123. Prerequisite: MATH 126, MATH 129, or MATH 134, any of which may be taken concurrently; PHYS 122. Offered: AWSpS.

### CHEMISTRY (10 credits)

#### ◆ CHEM 142 General Chemistry (5) NW, QSR

For science and engineering majors. Atomic nature of matter, stoichiometry, periodic table, quantum concepts, and gas laws. Includes laboratory. Recommended: high school chemistry and placement into MATH 120 or higher. No more than the number of credits indicated can be counted toward graduation from the following course groups: 142, 145 (5 credits). Cannot be taken for credit if CHEM 120 already taken. Offered: AWSpS.

#### CHEM 152 General Chemistry (5) NW

Energy, enthalpy and thermochemistry, spontaneity, entropy and free energy, electrochemistry, quantum mechanics and atomic theory, general concepts of bonding. Includes laboratory. Prerequisite: either 1.7 in CHEM 142 or 1.7 in CHEM 145. No more than the number of credits indicated can be counted toward graduation from the following course groups: 152, 155 (5 credits). Offered: AWSpS.

◆ *Admission requirement.*

*Minimum grade of 2.0 required for all program prerequisites.*

A minimum grade of 1.0 is required for courses used to satisfy CEE major graduation requirements.

## Course Descriptions: Engineering Fundamentals

◆ Admission requirement.

A minimum grade of 2.0 is required for all program prerequisites.

### ENGINEERING FUNDAMENTALS

#### ◆ AMATH 301 (preferred) or CSE 142

##### **AMATH 301 Beginning Scientific Computing (4) NW**

Introduction to the use of computers to solve problems arising in the physical, biological and engineering sciences. Application of mathematical judgment, programming architecture, and flow control in solving scientific problems. Introduction to MATLAB routines for numerical programming, computation, and visualization. Prerequisite: either MATH 125, Q SCI 292, MATH 128, or MATH 135. Offered: AWSpS.

##### **CSE 142 Computer Programming I (4) NW, QSR**

Basic programming-in-the-small abilities and concepts including procedural programming (methods, parameters, return values), basic control structures (sequence, if/else, for loop, while loop), file processing, arrays and an introduction to defining objects. Offered: AWSpS.

#### ◆ A A 210 Engineering Statics (4) NW

Vector analysis applied to equilibrium of rigid body systems and subsystems. Force and moment resultants, free body diagrams, internal forces, and friction. Analysis of basic structural and machine systems and components. Prerequisite: either MATH 126, MATH 129, or MATH 136; PHYS 121; recommended: graphics background. Offered: AWSpS.

#### ◆ CEE 220 Introduction to Mechanics of Materials (4) NW

Introduction to the concepts of stress, deformation, and strain in solid materials. Development of basic relationships between loads, stresses, and deflections of structural and machine elements such as rods, shafts, and beams. Load-carrying capacity of these elements under tension, compression, torsion, bending, and shear forces. Prerequisite: A A 210. Offered: AWSpS.

#### ◆ M E 230 Kinematics and Dynamics (4) NW Fabien

Kinematics of particles, systems of particles, and rigid bodies; moving reference frames; kinetics of particles, systems of particles, and rigid bodies; equilibrium, energy, linear momentum, angular momentum. Prerequisite: A A 210.

*In addition, one of the following:*

#### **M E 123 Introduction to Visualization and Computer-Aided Design (4) NW/VLPA**

Methods of depicting three-dimensional objects and communicating design information. Development of three-dimensional skills through freehand sketching and computer-aided design using parametric solid modeling. Offered: AWSpS.

#### **MSE 170 Fundamentals of Materials Science (4) NW**

Fundamental principles of structure and properties of materials utilized in practice of engineering. Properties of materials are related to atomic, molecular, crystalline structure. Metals, ceramics, multiphase systems, and polymeric materials. Relationships between structure and electrical, mechanical, thermal, chemical properties. For advanced freshmen and sophomores. Prerequisite: either CHEM 150, CHEM 152, or CHEM 155. Offered: AWSpS.

#### **E E 215 Fundamentals of Electrical Engineering (4) NW**

Introduction to electrical engineering. Basic circuit and systems concepts. Mathematical models of components. Kirchoff's laws. Resistors, sources, capacitors, inductors, and operational amplifiers. Solution of first and second order linear differential equations associated with basic circuit forms. Prerequisite: either MATH 126, or MATH 136; PHYS 122.

## Course Descriptions: Engineering Fundamentals

### **IND E 250 Fundamentals of Engineering Economy (4) NW**

Basics of industrial cost analysis and accounting. Application of interest computations to engineering decision making. Analysis of engineering alternatives based on use of interest computations, valuations, depreciation, and cost estimates. Offered: ASp.

### **CHEM E 260 Thermodynamics (4) NW**

Introduction to the basic principles of thermodynamics from a macroscopic point of view. Emphasis on the First and Second Laws and the State Principle, problem solving methodology. Prerequisite: either CHEM 140, CHEM 142, or CHEM 145; either MATH 126, MATH 129, or MATH 136; PHYS 121. Offered: AWSpS.

### **IND E 315 Probability and Statistics for Engineers (3) NW**

Application of probability theory and statistics to engineering problems, distribution theory and discussion of particular distributions of interest in engineering, statistical estimation and data analysis. Illustrative statistical applications may include quality control, linear regression, and analysis of engineering data sets. Prerequisite: either MATH 136 or MATH 307. Offered: AWSpS.

**NEW! Tell your friends!**  
**For Freshmen and Sophomores**  
**interested in the CEE major:**

### **CEE 100 Twenty First Century Civil and Environmental Engineering (1)**

Introduction to the modern discipline of civil and environmental engineering including major sub-disciplines, professional careers, projects and departmental faculty. Explores the different disciplines and their relevance to today's students. **Credit/No Credit, For general elective credit only.**

#### **NOTE:**

*Students who take IND E 315 as an Engineering Fundamental may apply any non-statistics, 300-level MATH course, except MATH 354 and 355, towards the mathematics requirement. IND E 315 may not be used to satisfy both Mathematics and Engineering Fundamentals requirements.*

## Course Descriptions: CEE 300-level Courses

*A minimum grade of 1.0 is required for 300-level CEE courses to satisfy major requirements.*

### **CEE 306 Construction Engineering (3)**

Introduction to construction engineering, planning, methods, contracts, and specifications. Scheduling manually and by using computer software. Production estimates; equipment selection; ownership and operating costs; role of the engineer in construction and cost estimating.

### **CEE 316 Surveying Engineering (4)**

Measurement and mapping techniques. Computer adjustment of measurements, analysis of error. Horizontal and vertical control. Global and plane coordinate systems, transformation. Horizontal and vertical curve computations, layout. Earthwork and volume measurements, computations. Leveling and datum considerations. Introduction to photogrammetry, GPS, GIS, remote sensing, cadastral surveys, and construction surveys. Prerequisite: MATH 126; Recommended: Statistics. Offered: A.

### **CEE 320 Transportation Engineering I (3)**

Study of vehicular transportation fundamentals including geometric design, pavement design, traffic flow concepts, level of service analysis, intelligent transportation systems, travel demand prediction methods, and management of transportation systems. Includes a review of relevant vehicle operating characteristics. Prerequisite: MATH 126; PHYS 121

### **CEE 342 Fluid Mechanics (4)**

Elementary mechanics of incompressible fluids. Hydrostatics. Continuity, energy, and momentum equations. Introduction to potential flow. Resistance phenomena for laminar and turbulent flows. Dynamic similitude. Prerequisite: CEE 220; M E 230; PHYS 122. Offered: A.

### **CEE 345 Hydraulic Engineering (4)**

Extension and application of fluid mechanics principles to hydraulic engineering problems. Open channel flow, pipeline systems, turbomachinery, unsteady flow in pipes, diffusion and mixing processes, groundwater, surface water hydrology. Prerequisite: CEE 342. Offered: WSp.

### **CEE 350 Environmental Engineering – Water and Air Quality (4)**

Description of water and air resources and parameters that characterize their quality, how their use alters their properties. Mass and energy balances as they apply to environmental systems. Global environment change. Basics of aquatic chemistry and microbiology applied to municipal water and wastewater treatment operations. Prerequisite: CHEM 142; MATH 126. Offered: Sp.

### **CEE 360 Sustainability in Civil Engineering (3)**

Introduces sustainability in civil engineering and construction. Emphasizes life cycle stages for infrastructure and building systems. Examines footprinting; life cycle costing; relevant performance metrics, codes and standards for professional practice. Uses tools, case studies, guest speakers, and innovative applications. Prerequisite: MATH 125; PHYS 121; CHEM 142. Offered: Sp.

### **CEE 363 Constructional Materials (4)**

General treatment of physical and mechanical properties and engineering behavior of metallic and nonmetallic materials. Steel, aluminum, asphalt concrete, Portland cement concrete, wood. Laboratory testing, instrumentation, and investigation into macrobehavior. Correlation with microstructure and various aspects of materials science. Prerequisite: CEE 220.

### **CEE 366 Basic Soil Mechanics (4)**

Introduction to basic soil properties, soil classification, volumetric relationships, compaction, consolidation, soil rheology, shear strength, bearing capacity, and lateral stresses against retaining structures. Prerequisite: CEE 220; CEE 342. Offered: WSp.

### **CEE 379 Elementary Structures I (4)**

Fundamental analysis and modeling of civil structural systems (trusses, beams, and frames), including design applications. Linear equilibrium, kinematics, and constitutive relations; formal solution procedures emphasizing element-based stiffness methods; computer-based and manual techniques; verification and interpretation of results; case studies involving local structures. Prerequisite: CEE 220. Offered: ASp.

## Course Descriptions: CEE 400-level Courses

### CEE 380 Elementary Structures II (4)

Structural design concepts, approaches, procedures, and codes. Characterization and determination of loads (dead, live, seismic, wind, etc.) Structural systems and system behavior (load paths, lateral and vertical response, failure modes and limit states). Structural component behavior and design (composite action, inelastic bending, column stability, member capacities). Prerequisite: CEE 379. Offered: WSp.

### CEE 391 Graphics Communication and Computer-Aided Design (3)

Introduction to graphics communication and computer-aided design tools to manipulate drawings, data, and geometric representations in civil engineering applications. Prerequisite: MATH 124.

### CEE 392 Basic Civil Engineering Computing (1)

Introduction to computer-based methods in civil and environmental engineering problems using Matlab. Prerequisite: CEE 220. *Waived if AMATH 301 is taken.*

### CEE 404 Infrastructure Construction (4)

**Construction Core.** Basic concepts of large infrastructure construction projects including planning, scheduling, life-cycle cost analysis (LLCA), construction cost, logistics, productivity and, where applicable, traffic impacts. Uses current and prototype industry software and involves direct contact with agency and contractor personnel involved in infrastructure projects. Prerequisite: CEE 306. Offered: Sp.

### CEE 410 Traffic Engineering Fundamentals (3)

**Transportation Core.** General review of the fundamentals of traffic engineering, including their relationship to transportation operations management and planning, with emphasis on calculations and procedures in the Highway Capacity Manual; field surveys and data analysis. Prerequisite: CEE 320.

### CEE 412 Transportation Data Management (3)

**Transportation Core.** Introduction to modern concepts, theories, and tools for transportation data management and analysis. Applications of software tools for transportation data storage, information retrieval, knowledge discovery, data exchange, on-line information sharing, statistical analysis, system optimization, and decision support.

### CEE 416 Urban Transportation Planning and Design (3)

**Transportation Core.** Brief review of major issues in urban transportation planning. Planning process discussed and transportation models introduced. Uses a systems framework, including goals and objectives, evaluation, implementation, and monitoring. A design term project, individual or small groups, utilizes material presented on a contemporary problem. Prerequisite: CEE 320. Offered: A.

### CEE 418 Computer-Aided Planning of Urban Systems (3)

Survey of on-line planning applications; use of various on-line systems to solve urban systems design problems; investigations of hardware/software tradeoffs; human factors in man-computer systems design theory as it relates to problem-solving activity. Offered: jointly with URBDP 429.

### CEE 421 Pavement Design (3)

**Construction Core.** Current and developing procedures for the structural thickness design of pavements. Bituminous and concrete pavements for highways, airports, and special heavy loading. Elastic layered systems, slab theory. Performance evaluation for maintenance and overlay design. Offered: ASp.

## Course Descriptions: CEE 400-level Courses

A minimum grade of 2.0 is required for core courses used to satisfy Technical Electives.

**CEE 423 Heritage of Civil Engineering (3) I&S**  
Contribution of civil engineering to civilization based on the lives and projects of prominent engineers and cultures. Incidents and individuals from prehistory to the nineteenth century give the student an awareness of the profession and its influence on society. Industrial archaeology and historic sites are considered. An additional 1 credit may be earned by participating in a special project. Emphasis on the control of elements and the methodology, planning, objectives, and reasons for the project. May be used as I & S distribution. Offered: W. **CEE 423 may not be used to satisfy CEE upper-division electives.**

**CEE 424 GIS for Civil Engineers (3)**  
GIS in civil engineering applications. Geographic and spatial data types and acquiring considerations. Data models and structures. Projections and transformations. Attribute-based operation, spatial operations. Surfaces and near neighbors. Training on Arc GIS software. Recommended: CEE 316.  
*NOTE: CEE 423 may NOT be used to satisfy Technical Electives or Upper-Division Engineering and Science Electives.*

**CEE 425 Reinforced Concrete Construction (3) Construction Core.** Processes in constructing reinforced concrete structures. Identification and development of solutions to potential constructability problems. Lectures augmented with industry speakers and a field trip to a building under construction. Requires senior or graduate standing in Civil Engineering or Construction Management and familiarity with reinforced concrete design/construction.

**CEE 428 Lightweight Cementitious Composites (2)**  
Introduction to the process of designing within constraints and introductory experimental design. Importance of proper laboratory documentation. Examines the characteristics of cementitious binders and elementary composite behavior. Considers constructability. Interprets pre- and post-cracking elastic behavior. Organization and production of technical report the documents work performed. Offered: A.

### CEE 431 Seismology and Earthquake Engineering (3) NW

Presents an overview of earthquake processes and details of the characteristics of destructive ground motion; illustrates the effects of such motion on engineering structures; reviews current practice in estimating earthquake hazards for important structures such as nuclear power plants. Prerequisite: either MATH 126, or both MATH 307 and MATH 308. Offered: jointly with ESS 465.

### CEE 436 Foundation Design (3)

**Geotech Core.** Design considerations for foundations and retaining structures. Subsurface investigations and determination of soil properties for design. Design of shallow and deep foundations and retaining structures. Foundations and soil considerations for waterfront structures. Prerequisite: CEE 366.

### CEE 437 Engineering Geology I (3)

**Geotech Core.** General overview of engineering geology and its importance to civil engineers. Topics include geologic processes, hazards, origin and classification of geologic materials, data synthesis, and natural construction materials.

### Required in Autumn Quarter Senior Year:

#### CEE 440 Professional Practice Studio (2)

Fundamentals of integrated civil engineering design, professional services marketing, project management, team dynamics, total quality management, value engineering, professional liability, and applied ethics in engineering practice. Emphasis on written and oral communications and on ethical, social, and economic factors.

CEE 440 must be taken in the Autumn Quarter.

## Course Descriptions: CEE 400-level Courses

### CAPSTONE DESIGN COURSES:

(Select one of following)

#### CEE 441 Transportation and Construction Capstone (4)

Comprehensive design project focusing on planning, design and construction of transportation project such as highways, transit, and airports. Prerequisite: CEE 320; CEE 440, which may be taken concurrently.

#### CEE 442 Structural Geotechnical Capstone Design Project (4)

Comprehensive team design project focusing on structural and geotechnical engineering. Requires design drawings, written reports, and oral presentations interfacing with related fields such as aesthetics and architecture, mechanical systems, traffic, environmental planning. Prerequisite: CEE 440; two courses from CEE 436, 451, 452, 453, 454, or 457.

#### CEE 444 Water Resources and Hydraulic Engineering Capstone Design Project (4)

Opportunity to effect design solutions for projects or major project components in such representative areas as reservoirs and associated systems for flood control, water supply, irrigation, and hydroelectric power, surface water control systems, fisheries related projects, small harbors, and coastal engineering problems. Prerequisite: CEE 345, 440, and one of the following: CEE 475, 476, 482, 483, or 484.

#### CEE 445 Environmental Engineering Capstone Design Project (4)

Individual and group design studies addressing environmental engineering problems such as stormwater management, water and wastewater treatment facilities, and residual processing. Prepare proposals, engineering reports, and alternative evaluations; process equipment design, present reports on selected design problems. Prerequisite: CEE 345, 440, and one of the following: CEE 475, 476, 481, 482, 483, or 484.

#### CEE 451 Design of Metal Structures (3)

**Structural Core.** Introduction to the design and behavior of metal structures using LRFD concepts. Application of design methods and codes to columns, beams, frames, connections, and tension members. Prerequisite: CEE 380; recommended: CEE 457, CEE 458.

#### CEE 452 Design of Reinforced Concrete Structures (3)

**Structural Core.** Fundamentals of design of buildings in reinforced concrete in accordance with current codes and practices. Prerequisite: CEE 380.

#### CEE 453 Prestressed Concrete Design (3)

**Structural Core.** Analysis, design, and construction of prestressed concrete structures. Prerequisite: CEE 452.

#### CEE 454 Design of Timber Structures (3)

**Structural Core.** The design and construction of timber structures, using elements made of sawn wood, glued-laminated wood, and plywood. Prerequisite: CEE 380.

#### CEE 455 Structural Unit Masonry (3)

**Structural Core.** Structural behavior and design of reinforced brick, tile, and unit concrete masonry structures. Prerequisite: CEE 380. Offered: jointly with ARCH 426.

#### CEE 457 Advanced Structures I (3)

**Structural Core.** The displacement method in matrix form with programming applications. Fundamentals of modeling of various types of structures. Prerequisite: CEE 379.

#### CEE 458 Advanced Structures II (3)

Introduction to stability, including a consideration of elastic and inelastic buckling with applications to beam-columns and plates. Introduction to plastic analysis. Prerequisite: CEE 457.

#### CEE 459 Advanced Structural Mechanics (3)

Formulation and solution of the basic equations of elasticity. Applications in 2-D stress analysis, torsion, thermal stresses, and beams on elastic foundation. Plate theory optional. Prerequisite: CEE 379.

## Course Descriptions: 400-level CEE Courses

A minimum grade of 2.0 is required for core courses used to satisfy Technical Electives.

### CEE 462 Applied Limnology and Pollutant Effects on Freshwater (3/5) NW

**Environmental Core.** Principles of aquatic ecology that relate to causes and effects of water quality problems in lakes and streams. Population growth kinetics, nutrient cycling, eutrophication; acidification, oxygen/temperature requirements, and effects of various wastes on aquatic animals.

### CEE 463 Limnology Laboratory (2) NW

Examination of biota of fresh waters, survey of limnological methods, analysis of data, and writing of scientific papers. Prerequisite: BIOL 473/FISH 473/CEE 462, any of which may be taken concurrently. Offered: jointly with BIOL 474/FISH 474; A.

### CEE 472 Introduction to Hydraulics in Water Resources (3)

Hydraulics related to environmental issues. Global hydrology; stratified flows; two-phase (bubble) flows; pollutant transport and mixing in reservoirs, lakes, coastal waters, and oceans; diffuser design and related case studies. Prerequisite: CEE 342; CEE 345.

### CEE 473 Coastal Engineering I (3)

Linear theory of water waves, wave transformations due to boundary conditions, sediment motion, elementary tidal theory; applications illustrated by laboratory experiments and selected case histories. Prerequisite: CEE 342.

### CEE 474 Hydraulics of Sediment Transport (3)

**Water Core.** Introduction to sediment transport in steady flows with emphasis on physical principles governing the motion of sediment particles. Topics include sediment characteristics, initiation of particle motion, particle suspension, bedforms, streambed roughness analysis, sediment discharge formulae, and modeling of scour and deposition in rivers and channels. Prerequisite: CEE 345.

### CEE 475 Analysis Techniques for Groundwater Flow (3)

Development of appropriate equations to describe saturated groundwater flow, and application of numerical methods for solving groundwater flow problems and flow to wells. Participants required to solve specific problems using numerical techniques developed during the course. Prerequisite: CEE 342.

### CEE 476 Physical Hydrology (3)

**Water Core.** Global water picture, data sources and data homogeneity, precipitation, evapotranspiration, hydrographs. Hydrologic data frequency analysis. Hydrologic design: flood mitigation, drainage. Introduction to deterministic and stochastic models. Prerequisite: CEE 345.

### CEE 477 Open-Channel Engineering (3)

**Water Core.** Water flow in natural and constructed channels. Analysis and design of canals, transitions, energy dissipators, and similar structures. Analysis of surface profiles and effect of nonlinear alignment on flow. Introduction to river mechanics. Design-oriented problems. Prerequisite: CEE 345.

### CEE 480 Air-Quality Modeling (3)

**Environmental Core.** Evaluation of air-quality models relating air pollution emissions to environmental concentrations. Topics include meteorological dispersion models and various "receptor" models based on chemical "fingerprinting" of sources. Emphasizes current problems. Offered: jointly with ATM S 480.

## Course Descriptions: 400-level CEE Courses

### **CEE 481 Hydraulic Design for Environmental Engineering (3)**

**Environmental Core.** Introduction to the theory and the practice of planning and design of urban water supply distribution, pump stations, and sewage and storm-water collection systems. Evaluation of service areas and service requirements and their relationships to urban and regional planning activities. Engineering methods and computer programs for designing basic system elements. Prerequisite: CEE 345; CEE 350.

### **CEE 482 Wastewater Treatment and Reuse (3)**

**Environmental Core.** Introduction to wastewater treatment and systems, emphasizing fundamental biological, chemical and physical processes related to protection of public health and water pollution control. Process analysis of the configuration of sizing of major types of treatment processes for various sizes of plants and effluent requirements. Prerequisite: CEE 350.

### **CEE 483 Drinking Water Treatment (3)**

**Environmental Core.** Scientific and engineering principles underlying drinking water treatment; analysis of key contaminants; development of conceptual models for how and why treatment processes work and mathematical models describing their performance under various design and operating scenarios; field trips to water treatment systems. Prerequisite: CEE 350.

### **CEE 484 Decentralized and On-Site Wastewater Management and Reuse (3)**

**Environmental Core.** Design and performance of onsite and decentralized wastewater treatment. Determination of appropriate alternatives based on endpoints of water reuse, economics, policy, management, water quality, and ecological considerations. Meeting sanitation and water reuse for situations including, individual homes, rural areas, developing countries, and high density urban dwellings. Prerequisite: CEE 350.

### **CEE 485 Environmental Engineering Chemistry (3) Benjamin, Korshin**

Fundamentals of chemical equilibrium in natural water systems. Behavior of open and closed aqueous and multi-media (air/water/solids) systems. Chemistry of major species affecting the environment. Identification of key parameters for characterizing water quality and of chemical processes. Recommended: one year of general chemistry or equivalent.

### **CEE 486 Environmental Analysis Laboratory (3)**

Introduction to water quality parameters; theory of instrumentation and methods used for the environmental analysis. Laboratory analysis of environmental samples using a variety of techniques including titrations, chromatography, and absorption and emission spectrophotometry. Recommended: one year of general chemistry.

### **CEE 487 Solid-Waste Disposal (3)**

Describes sources and handling of municipal and industrial solid waste, with examination of collection, processing, recycling and resource recovery, and disposal alternatives. Public policy issues, local agencies and solid waste facilities, the legal and regulatory framework are all addressed in context of solid waste engineering.

### **CEE 488 Hazardous Wastes Engineering (3)**

Classification of hazardous wastes; resource conservation, Recovery Act regulations; characteristics and behavior of toxic organics; superfund; groundwater contamination, solutions. Hazardous waste site remedial action; case histories; sampling; landfill design. Stabilization and processing technologies, including incineration, carbon adsorption, emerging techniques.

## Course Descriptions: CEE 400-level Courses

A minimum grade of 2.0 is required for core courses used to satisfy Technical Electives.

### CEE 489 Water and Air Quality Sampling (2)

Samples collected from lakes, streams, precipitation, and air and resulting (and supplemental) data interpreted for cause-effect and statistical inference. Design for water and air quality monitoring programs. Prerequisite: CEE 462.

### CEE 490 Air-Pollution Control (4)

**Environmental Core.** Fundamental concepts of air pollution. Emission sources, atmospheric dispersion, ambient concentrations, adverse effects, governmental regulations, emission standards, air-quality standards, processes and equipment for controlling emissions. Offered: jointly with ENV H 461.

### CEE 491 Deterministic Systems (3)

Development of quantitative methods for mathematical problem solving with emphasis on computer applications. Linear programming, mathematics of the simplex algorithm, sensitivity analysis, dynamic programming, systems simulation, and goal programming. Class project required. Prerequisite: CEE 390.

### CEE 492 Stochastic Systems (3)

Introduction to probability distributions and statistics useful in systems analysis, conditional distributions, queuing theory and applications, Monte Carlo simulation, chance-constrained mathematical programming, and stochastic dynamic programming. Emphasis on application of the techniques to civil engineering systems problems, including transportation, water resources, and structures. Prerequisite: CEE 491.

### CEE 493 Air-Pollution Source Testing and Equipment Evaluation (3)

Engineering evaluation of air pollutant sources and air control equipment. Fundamentals of source testing and stack sampling including laboratory exercises.

### CEE 494 Air-Pollution Control Equipment Design (3)

Designs to control air pollutants from stationary sources. Procedures for calculating design and operating parameters. Fundamental mechanisms and processes of gaseous and particulate control equipment for absorption and adsorption of gaseous pollutants; electrostatic precipitation and filtration of particulate pollutants. Actual case studies. Offered: jointly with CHEM E/M E 468.

### CEE 495 Sustainability and Design for Environment (3)

Analysis and design of technology systems within the context of the environment, economy, and society. Applies the concepts of resource conservation, pollution prevention, life cycle assessment, and extended product responsibility. Examines the practice, opportunities, and role of engineering, management, and public policy. Offered: jointly with ENVIR 415/M E 415; S.

### CEE 498 Special Topics (1-5, max. 5)

Special topics in civil engineering offered as course with lecture and/or laboratory. Maximum of 6 credits in combination of 498 and 499 may be applied toward an undergraduate degree.

### CEE 499 Special Projects (1-5, max. 5)

Individual undergraduate research projects. Maximum of 6 credits in combination of 498 and 499 may be applied toward an undergraduate degree. Recommended: 400-level CEE course. *To enroll in CEE 499, download the CEE 499 request form from the CEE Student Resources Web site. Complete the form with your sponsoring faculty member. Submit completed form to More Hall 201.*

## Upper-Division Engineering & Science Electives

This is a sample list of approved Upper-Division Engineering and Science Courses. For up-to-date approved courses, see the CEE Student Resources Website. Students may also request other courses to be approved by submitting a Graduation Petition (available for download from the CEE Student Resources Website).

All 300- and 400-level engineering courses from ME, CHEM E, A A, E E, CSE, IND E, and MSE., and all CEE 400-level courses, except CEE 423 (I & S) will count.

**Exceptions: The following courses may NOT be used for Upper Division Engineering and Science Electives:** CEE 423, CHEM E 309 (VLPA), T C 231, 333, ENGR 301, 310 321, 322, 468, IND E 315, any math or statistics courses.

### LIST OF APPROVED UPPER-DIVISION ENGINEERING & SCIENCE ELECTIVES (LIST B)

COURSE	TITLE	CREDITS
ARCH 310	ARCHITECTURAL DESIGN DRAWING I	3
ARCH 331	ENVIRONMENTAL CONTROL SYSTEMS	3
ARCH 431	ENVIRONMENTAL CONTROL PRINCIPLES	3
ARCH 433	ACTIVE CONTROL SYSTEMS FOR BLDG OPERATION	3
ARCH 436	BUILDING ACOUSTICS	3
ARCH 437	PASSIVE THERMAL CONTROLS	3
ARCH 574	DESIGN AND CONST LAW	3
ASTR 301	ASTR FOR SCIENTISTS & ENGR	3
ASTR 322	CONTESTS OF OUR GALAXY	3
ATM S 301	INTRO ATMOSPHERIC SCIENCES	5
ATM S 321	PHYSICAL CLIMATOLOGY	3
ATM S 340	INTRO THERMODYNAMICS & CLOUD PROCESSES	5
ATM S 358	FUND ATMOS CHEMISTRY	3
ATM S 370	ATMOSPHERIC STRUCTURE & ANALYSIS	5
BIOL 180	INTRO BIOLOGY	5
BIOL 200	INTRO BIOLOGY	5
BIOL 220	INTRO BIOLOGY	5
BIOL 340	GENETICS & MOLECULAR ECOLOGY	5
BIOL 438	BIOLOGICAL MONITOR & ASSESSMENT	5
BIOL 472	PRINCIPLES OF ECOLOGY	5
BIOL 473	LIMNOLOGY	3
BIOL 475	LIMNOLOGY LAB	2
BIOL 476	CONSERVATION BIOLOGY	5
BOTANY 354	INTRO TO PLANT ECOLOGY	5
BOTANY 428	MOLECULAR & CELLULAR BIOL OF PLANTS	3
CHEM 162	GENERAL CHEMISTRY	6
CHEM 223	ORGANIC CHEM, SHORT PROGRAM	4
CHEM 224	ORGANIC CHEM, SHORT PROGRAM	4
CHEM 237	ORGANIC CHEMISTRY	4
CHEM 238	ORGANIC CHEMISTRY	4
CHEM 239	ORGANIC CHEMISTRY	3
CHEM E 260	THERMODYNAMICS	4
CM 310	INTRO TO CONSTRUCTION INDUSTRY	3
CM 312	CONSTRUCTION ACCOUNTING	3

## Upper Division Engineering & Science Electives

COURSE	TITLE	CREDITS
CM 320	CONSTRUCTION CONTRACT DOCUMENTS	3
CM 331	CONSTRUCTION ESTIMATING I	4
CM 332	CONSTRUCTION EQUIP MANAGEMENT	3
CM 410	CONSTRUCTION ESTIMATING II	4
CM 411	PROJECT PLANNING & CONTROL	3
CM 420	TEMPORARY STRUCTURES	3
CM 421	PROJECT MANAGEMENT I	3
CM 422	COMPUTER APPLICATIONS IN CONSTRUCTION	3
CM 454	INTRO TO REAL ESTATE FINANCE	4
CSE 143	COMPUTER PROGRAMMING II	5
EHUF 477	WETLAND RESTORATION	5
ENV H 405	TOXIC CHEM AND HUMAN HLTH	3
ENV H 445	SOLID WASTE MGMT	3
ENV H 446	HAZARDOUS WASTE MGMT	3
ENV H 490	COMMUNITY AIR POLLUTION	3
ESRM 210	INTRODUCTORY SOILS	4
ESRM 311	SOILS AND LAND USE	3
ESRM 320	OLD GROWTH & FOREST MGMT	5
ESRM 322	FOREST ECOSYSTEMS	3
ESRM 401	SPRING COMES TO THE CASCADES	3
ESRM 418	COMPOST & ORGANIC SOIL AMENDMENTS	5
ESRM 441	LANDSCAPE ECOLOGY	5
ESS	VARIOUS COURSES	5
FE	VAROUS COURSES	4
FISH 312	FISHERIES ECOLOGY	5-Mar
FISH 323	CONSERVATION & MGMT OF AQUATIC RESOURCES	5
FISH 324	BIOL & CULTURE OF AQUATIC ORGMS	5
FISH 428	RESTORATION OF FISH COMM & HABITAT IN RIVER ECOSYS	5
FISH 430	BIOL PROLBEMS IN WATER POL	5-Mar
FISH 447	WATERSHED ECOL & MANAGEMENT	3
FM 328	FORESTRY-FISHERIES INT' ACTIONS	4
GEOG 230	URBANIZATION & DEVELOP: GEOG OF GLOBAL INEQUALITY	5
GEOG 277	GEOGRAPHY OF CITIES	5
GEOG 360	PRINCIPLES OF CARTOGRAPHY	5
GEOG 370	PROB RESOURCE MGMT	5
GEOG 435	INDUSTRIALIZATION & URBANIZATION IN CHINA	5
GEOG 460	GEOGRAPHIC INFO SYSTEMS	5
GEOG 461	URBAN GEOGRAPHIC INFO SYS	5
GEOG 471	METHODS OF RESOURCE ANALYSIS	5
L ARCH 331	LANDSCAPE CONSTRUCTION	4
L ARCH 341	SITE PLANNING	3
L ARCH 433	LARGE-SCALE SITE CONSTRUCTION	4
ME 295	PRODUCT DISSECTION	3
MICROM 301	GEN MICROBIOLOGY	3
MICROM 302	GEN MICROBIOLOGY, LAB	2

## Upper Division Engineering & Science Electives

COURSE	TITLE	CREDITS
MICROM 301	GEN MICROBIOLOGY	3
MICROM 302	GEN MICROBIOLOGY, LAB	2
OCEAN 400	CHEMICAL OCEANOGRAPHY	4
OCEAN 410	MARINE GEOLOGY & GEOPHYSICS	4
OCEAN 420	PHYSICAL PROCESSES IN THE OCEAN	3
OCEAN 421	CHEMICAL OCEANOGRAPHY	4
OCEAN 450	CLIMATIC EXT	4
PHYS 224	THERMAL PHYSICS	3
PHYS 225	MODERN PHYSICS	3
PHYS 227	ELEMENTARY MATHEMATICAL PHYSICS	3
PHYS 228	ELEMENTARY MATHEMATICAL PHYSICS	3
PSE 476	PULPING & BLEACHING PROCESSES	3
URBDP 429	COMPUTER-AIDED PLANNING OF URBAN SYSTEMS	3
URBDP 457	HOUSE DEV COUNTRIES	3
URBDP 465	LAND USE	3
URBDP 466	INFRASTRUC & COMM FACILITIES	4
URBDP 479	THE URBAN FORM	3

### COURSE PETITION FOR APPROVAL AS UPPER-DIVISION ENGINEERING & SCIENCE ELECTIVE

To submit a course (that is not on the pre-approved list) for approval for use as an Upper-Division Science and Engineering Elective, you will need to complete a Graduation Petition (downloadable from the CEE Student Resources Webpage) and provide the following information:

- Course Prefix & Number
- Course Title
- Institution where course was taken, if not UW
- Quarter/Semester and Year
- Course Description (required)
- Course Syllabus (required)
- Course Website (optional, if available, or in place of paper syllabus attachments)
- Additional information, such as textbook and course materials (examinations, papers, projects, etc.) will be helpful and may be requested.

An unofficial copy of your transfer transcript may also be requested.

You will return the Graduation Petition form along with supporting documents to the Civil & Environmental Engineering Department in More Hall 201, Box, 352700. You may also submit this form and attachments electronically to [ceadvic@u.washington.edu](mailto:ceadvic@u.washington.edu).

NOTIFICATION: Course evaluation requests are typically reviewed weekly during the academic year by the Undergraduate Program director or CEE faculty. You will be notified of the results by email. Any approved changes will also be coded into the University degree audit system.

## UW College of Engineering Policy on Academic Misconduct

Sited from <http://www.engr.washington.edu/mycoe/am/ampolicy.html>

Academic misconduct or violation of Engineering Ethics is unacceptable in the practice of engineering. When you graduate and practice as an engineer, you will be subject to the [Code of Ethics of Engineers](#). While preparing to be an engineer, you are subject to specific rules regarding academic misconduct.

### What does academic misconduct encompass?

- Cheating on examinations  
Cheating on individual projects
- Fraud
- Theft or alteration of other people's work on academic materials for the purpose of improving one's own grades or acquiring academic credit

### What can happen if I am found guilty of academic misconduct?

Students accused of academic misconduct will be referred for disciplinary action pursuant to the [University of Washington Student Conduct Code](#). If found guilty, students are subject to sanctions which can include:

- Disciplinary Warning
- Restitution
- Probation
- Suspension
- Dismissal from the University

The College of Engineering (COE) expects all students to behave in a mature manner and to be responsible for their actions. The COE does not accept excuses for misconduct and will prosecute all allegations of misconduct according to the procedures outlined in the CoE [Academic Misconduct Process](#).

### What is Cheating?

Most academic misconduct falls under the definition of plagiarism (see below), but sometimes we refer to misconduct as cheating. The following is a list of several examples of cheating:

#### Examples of Cheating:

- Allowing another to prepare an assignment for you or preparing an assignment for another.
- Having another take an examination for you or taking an examination for another.
- Obtaining information about an examination or assignment that is not authorized by the instructor.
- Altering an answer to an examination after it has been turned in, whether it has been graded or not.
- Looking at another's paper during an examination or allowing another to look at your paper.
- Collaborating with another during examination or on an assignment where the work is to be done independently.
- Bringing materials or information to an examination that are not permitted by the instructor.

### What is Plagiarism?

Plagiarism is taking someone else's work from any source, i.e., someone's ideas, writings, or inventions, and using it WITHOUT ACKNOWLEDGMENT. As long as you give credit to the originator of the material, you are not guilty of plagiarism. Merely enclosing statements or sentences in quotation marks is not sufficient; you must cite the source.

## UW College of Engineering Policy on Academic Misconduct

### Examples of Plagiarism:

- Copying phrases, sentences, sections, paragraphs, or graphics from a source and not giving credit by citing the source.
- Turning in a paper from a previous class.
- Having another person write an assignment (for pay or for free) and putting your name on it.
- Modifying or paraphrasing another's ideas or writings and submitting them as your own.
- Having someone make substantial editorial changes to your paper and submitting the final version as your own.
- Turning in someone else's solution to an exam or a question on an exam as your own.
- Sharing computer code in assignments for individual students; use of someone else's computer code in assignments for individual students; use of someone else's computer code without acknowledgement; use of someone else's computer code when it is prohibited by the instructor.

### Examples that are *not* Plagiarism:

- Asking someone to read your assignment and suggest possible improvements, unless specifically forbidden by the instructor.
- Getting together with other students to discuss an assignment, unless specifically forbidden by the instructor.
- Asking your instructor for help with an assignment.
- Quoting extensively from another's work but giving credit.

### Why is it so important?

Copying (or plagiarizing) someone's work, without giving due recognition, is regarded as the equivalent of **STEALING AND FRAUD**, especially in the Western world (USA, Canada, and Europe). It is highly probable that it will be detected, so do not do it under any circumstances. It could ruin your career.

### How can I avoid Plagiarism?

**ALWAYS** make very clear reference to the source of the material you use and put the material taken in "quotation marks," no matter where you find it. This is perfectly acceptable and legitimate. **DO NOT** try to rewrite or change another person's work and pass it off as your own - this is very difficult to do and is easily detected.

### When can I use other people's work?

You can always use published writings as long as you give a formal reference and acknowledgment of the source. If the information comes from a conversation with a professor or another student, give their name and recognition that it is their thought.

Again, **NEVER** take another person's writing or speech or message or Internet data and put it in your work without acknowledgment. It is important to always make sure in your career that everyone who makes a contribution gets credit, no matter how small their part has been!

If you have questions, please check with your instructor or TA.

### What can happen if I commit Plagiarism?

At a **MINIMUM** the Professor will give you a very poor grade and may report the incident to the Associate Dean in the College of Engineering. You will then certainly receive a formal reprimand from the Dean, at a **MINIMUM**. Please refer to the Student Conduct Code of the Washington Administrative Code for a list of the possible sanctions that may be imposed.

It is foolish and completely unnecessary to plagiarize - **DO NOT DO IT!**

## UW College of Engineering Academic Misconduct Process

(updated: May 2008, <http://www.engr.washington.edu/mycoe/am/amprocess.html>)

The Associate Dean (AD) of Academic Affairs and the Council on Educational Policy (CEP) have agreed to this revised academic misconduct process. This process goes into effect at the beginning of fall quarter, 2008. This streamlined process is consistent with the UW Student Code.

Course instructors are encouraged to handle Academic Misconduct issues directly with the student(s) involved. The instructor shall present the student with the information that the instructor has that suggests the student committed Academic Misconduct. The instructor should then ask the student to provide an explanation. If the instructor still believes the student committed Academic Misconduct, the instructor should suggest a resolution (such as no credit for the portion of the work involving Academic Misconduct). This process will generally have two possible outcomes:

### Outcome 1

The student concurs with the instructor's findings. The follow-up is:

The instructor sends documentation of the case to the AD see [Report of Academic Misconduct – Informal Process](#) (PDF).

1. The case is listed in the AD's database.
2. The AD sends a letter to the student confirming the agreement with the instructor concerning penalty, explaining to the student that a record of the incident will be maintained and may be considered in case of future academic misconduct by the student, and explaining the appeal process.
3. A copy of the letter is sent to Elizabeth Higgins, Director, Community Standards & Student Conduct.

**If the AD's records indicate that this is not a first offense, the case should be referred to the CEP hearing panel so that a sanction in addition to the zero credit for the work can be considered (see Outcome 2, Steps 3-8, below). Sanctions may range from reprimand, to probation and to recommendation of dismissal.**

### Outcome 2

The student denies the allegation or objects to the proposed resolution. The follow-up is:

The instructor sends documentation of the case to the AD for Academic Affairs using the form [Report of Academic Misconduct – Formal Process](#) (PDF).

1. The case is entered into the AD's database.
2. The AD sends the student a letter notifying him/her of the allegation and informing him/her that the Dean's representative will be in touch to set up a meeting to explain the adjudication process.
3. The AD informs the Vice Chair of the CEP of the case, and requests that a hearing panel be scheduled.
4. The Dean's Representative meets with the student to explain the College-level adjudication process and provides the student with a copy of the evidence of apparent Academic Misconduct that has been supplied by the instructor.
5. The student meets with the Council on Educational Policy (CEP) subcommittee to present his/her side of the case.
6. The CEP subcommittee sends a report of the hearing to the AD.
7. The AD reviews the CEP subcommittee's findings and sends a letter of concurrence to the student and the instructor.
  - o If the finding is to exonerate the student, the AD informs the student in writing that the allegation has been dropped. The AD notifies the instructor to issue the appropriate grade for the assignment or exam and the final grade for the course reflecting exoneration. The AD's database is updated to reflect this finding.
  - o If the finding confirms academic misconduct, the letter should indicate the penalty, explain to the

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## UW College of Engineering Academic Misconduct Process

student that a record of the incident will be maintained and may be considered in case of future academic misconduct by the student, and explain the appeal process. The letter should be copied to Elizabeth Higgins, Director, Community Standards & Student Conduct.

If the student wishes to appeal, the case goes to the Chair of the University Disciplinary Committee, c/o Elizabeth Higgins, as described in the letter of concurrence from the AD.

## Student Code of Conduct (WAC 478-120)

*Some excerpts from the UW Student Conduct Code of the Washington Administrative Code (WAC 478-120)*

*“The University is a public institution having special responsibility for providing instruction in higher education, for advancing knowledge through scholarship and research, and for providing related services to the community. As a center of learning, the University also has the obligation to maintain conditions conducive to freedom of inquiry and expression to the maximum degree compatible with the orderly conduct of its functions. For these purposes, the University is governed by the rules, regulations, procedures, policies, and standards of conduct that safeguard its functions and protect the rights and freedoms of all members of the academic community.*

***“Admission to the University carries with it the presumption that students will conduct themselves as responsible members of the academic community. As a condition of enrollment, all students assume responsibility to observe standards of conduct that will contribute to the pursuit of academic goals and to the welfare of the academic community. That responsibility includes, but is not limited to:***

- (a) Practicing high standards of academic and professional honesty and integrity;*
- (b) Respecting the rights, privileges, and property of other members of the academic community and visitors to the campus, and refraining from any conduct that would interfere with University functions or endanger the health, welfare, or safety of other persons;*
- (c) Complying with the rules, regulations, procedures, policies, standards of conduct, and orders of the University and its schools, colleges, and departments.*

**Violation of the Student Code of Conduct may result in the following possible actions:**

**Exoneration** - The Committee may find that there is not enough evidence to warrant any action being taken against you.

**Warning** - This sanction serves to let you know that you have not acted properly and that, in the future, any repetition of misconduct could result in a more serious sanction, such as restitution, probation, suspension or dismissal.

**Reprimand** - A reprimand will serve to notify you that any repeat violations may result in a more serious sanction such as restitution, probation, suspension or dismissal.

**Restitution** - You will be required to repay damages or losses to the University or for injuries to other persons. This may also take the form of a requirement to perform community service. Failure to make restitution will result in cancellation of your registration.

**Disciplinary Probation** - Being placed on Disciplinary Probation means that further misconduct will raise the question of suspension or dismissal from the University.

**Suspension** - If the Committee on Academic Standards recommends suspension, your case will be referred to the Faculty Appeal Board through the Office of the Vice President for Student Affairs for a final determination. You will then have the right to request a formal hearing.

**Dismissal** - This means that your enrollment in the University may be terminated. If the Committee on Academic Standards recommends dismissal, your case will be referred to the Faculty Appeal Board through the Office of the Vice President for Student Affairs for a final determination. You will then have the right to request a formal hearing.

## Code of Ethics for Engineers

### The Fundamental Principles

<http://www.engr.washington.edu/org/CodeofEthics.htm>

Engineers uphold and advance the integrity, honor and dignity of the engineering profession by:

1. using their knowledge and skill for the advancement of human welfare;
2. being honest and impartial, and serving with fidelity the public, their employers and clients;
3. striving to increase the competence and prestige of the engineering profession; and
4. supporting the professional and technical societies of their disciplines.

### The Fundamental Canons

1. Engineers shall hold paramount the safety, health and welfare of the public in the performance of their professional duties.
2. Engineers shall perform services only in the areas of their competence.
3. Engineers shall issue public statements only in an objective and truthful manner.
4. Engineers shall act in professional matters for each employer or client as faithful agents or trustees, and shall avoid conflicts of interest.
5. Engineers shall build their professional reputation on the merit of their services and shall not compete unfairly with others.
6. Engineers shall act in such a manner as to uphold and enhance the honor, integrity and dignity of the profession.
7. Engineers shall continue their professional development throughout their careers and shall provide opportunities for the professional development of those engineers under their supervision.

For more information, see the American Society of Civil Engineers at [www.asce.org/inside/codeofethics.cfm](http://www.asce.org/inside/codeofethics.cfm).

## Scholarships & Awards

Student scholarships are available through the Department of Civil & Environmental Engineering as well as the College of Engineering, the University, and through a variety of industry and professional associations.

Applications for College of Engineering annual scholarships are accepted beginning January 15 for awards the following academic year. For more information on College of Engineering scholarships, see the Engineering Advising and Diversity Center (EADC) at [www.engr.washington.edu/advising/scholarship.html](http://www.engr.washington.edu/advising/scholarship.html) or in Loew Hall 301.

The Department of Civil and Environmental Engineering offers over 20 full-tuition annual scholarships for new and continuing majors. Some of these scholarships are merit-based, some are need-based, and others pertain to specific conditions, such as interest in a particular field or area within engineering, and/or personal background (such as residency and/or cultural heritage as specified as the donor). To be considered for CEE departmental scholarships, students must complete the departmental application form (available online) by April 1 for award the following academic year. See the CEE Student Resources Webpage for more information.

In addition to engineering and pre-engineering scholarships, the University of Washington Undergraduate Scholarship Office (USO) administers a range of on-campus and national scholarships for incoming freshmen, transfer, and continuing students, and for those involved in research, leadership, and/or outstanding academic performance. To learn more about these scholarship opportunities, visit the USO or visit Mary Gates Hall 120.

## Continuation Policy

The Undergraduate adviser monitors the academic progress of all CEE majors on a quarterly basis. The quarterly grade reports are reviewed for indications of academic difficulty and danger of low scholarship: grades below passing in CEE courses, a quarterly GPA lower than 2.0, and/or a cumulative GPA lower than 2.0. Students flagged with these indicators are contacted by email and/or phone, and the students are encouraged to meet with the adviser as soon as possible to discuss any problems they may be having. The meetings are intended to be intervention measures to provide timely support and attention and are not disciplinary in nature.

The University "Low Scholarship" policy (see [http://www.washington.edu/students/genecat/front/Low\\_Scholarship.html](http://www.washington.edu/students/genecat/front/Low_Scholarship.html)) applies to CEE majors. CEE majors must maintain a minimum cumulative GPA of 2.0, to avoid University action for low scholarship.

### **HINTS!**

- To stay in good standing and to make satisfactory progress, stay with the program! Take the recommended courses as you pursue your BSCE degree.
- If you must attend part-time or if you take other classes that may interfere with normal progress (e.g., study abroad, ESL courses, etc), notify the undergraduate adviser and work out an individualized graduation plan.
- Don't take courses that are intended to satisfy major or general education requirements with Satisfactory/Non Satisfactory (S/NS) grading option. Courses graded "S" may be used only for University general electives. *[Do not confuse S/NS with Credit/No Credit (CR/NC) grading. CR/NC grading option is used by the department or the University when the numerical grading option is not offered. "CR" graded courses may be used to satisfy any requirement]*
- If you experience any difficulties that affect your academic performance, talk to your undergraduate adviser.

## CEE Computer Resources and Support

The CEE Department provides a computer lab in the basement of More Hall (MOR 001) which houses approximately 75 (Windows XP) computers for students. The lab computers area loaded with an array of software ranging from common applications (such as the Microsoft Office products) to specialized engineering applications requested by faculty for their respective areas and research needs. (For more information on installed software, [www.ce.washington.edu/resources/computing/lab\\_software.html](http://www.ce.washington.edu/resources/computing/lab_software.html))

The department participates in the UW Microsoft Campus Agreement (MSCA), which entitles students to download and use licensed produced covered under the MSCA agreement. For more information, see the CEE Computing Resources Website at [www.ce.washington.edu/resources/computing/computing\\_resources.html](http://www.ce.washington.edu/resources/computing/computing_resources.html).

For additional software acquisition and/or questions on licensing, please see UWare at [www.washington.edu/uware/](http://www.washington.edu/uware/).

CEE students will have access to the More Hall 001 computer lab anytime the building is open by swiping their Husky Card in the electronic key lock to unlock the door. All incoming CEE students will automatically be authorized to access the computer lab using their Husky Card. In the event that your Husky Card is not working to unlock the door, please contact one of the Department's IT staff, Nicholas Burmeister (whose office is located right outside the computer lab) or Dr. Serhad Ataturk (MOR 128), or write to [help@ce.washington.edu](mailto:help@ce.washington.edu).

For help with your general UW services (such as your UW NetID, password, and email account), please write to UW Computing & Communications at [help@cac.washington.edu](mailto:help@cac.washington.edu).

## Other Resources & Organizations

### Engineering Writing Center

[www.uwtc.washington.edu/programs/ecp/ewc](http://www.uwtc.washington.edu/programs/ecp/ewc)  
Engineering Annex, room 304  
[eiwc@u.washington.edu](mailto:eiwc@u.washington.edu)  
206-221-4184

### Engineering Advising & Diversity Center

[www.engr.washington.edu/advising/](http://www.engr.washington.edu/advising/)  
Loew Hall 301  
[eadc@engr.washington.edu](mailto:eadc@engr.washington.edu)  
206-543-1770

### Engineering Co-op

[www.engr.washington.edu/coop](http://www.engr.washington.edu/coop)  
Loew Hall 301  
[coop@engr.washington.edu](mailto:coop@engr.washington.edu)  
206-543-8711

### UW Career Center

<http://depts.washington.edu/careers/>  
Mary Gates Hall 136  
[ccscnslr@u.washington.edu](mailto:ccscnslr@u.washington.edu)

### Transporation Northwest (TransNow)

[www.transnow.org](http://www.transnow.org)  
More Hall 129  
[transnow@u.washington.edu](mailto:transnow@u.washington.edu)  
206-543-8255

### American Association of Civil Engineers (ASCE)

*ASCE UW Student Chapter*  
<http://students.washington.edu/asce/Site/>  
*ASCE National Professional Organization*  
[www.asce.org](http://www.asce.org)

### Chi Epsilon

*National Civil & Environmental Engineering Honor Society*  
[www.chi-epsilon.org/](http://www.chi-epsilon.org/)

### Enigneers Without Borders

UW Chapter  
<http://students.washington.edu/ewbuw/>

## Post-Graduation Planning

### Engineering Licensing (EIT)

#### Engineering Licensing: Engineer-In-Training (EIT) and PE Exams

To receive licensing as a Professional Engineer (PE), you will need to pass the Fundamentals of Engineering (FE) examination (sometimes referred to as the Engineer-in-Training or EIT exam), earn four years of engineering experience and pass the PE examination. The earliest a student can take the EIT/FE exam is during his or her senior year. The FE/EIT exam lasts eight hours and has problems covering three areas: Science, mathematics, and engineering science. You will need to register for the FE/EIT exam four months in advance. In recent years, the FE/EIT exam has been offered twice a year in October and April. For more information, go to the Department of Licensing website at [www.dol.wa.gov/business/engineerslandsurveyors/index.html](http://www.dol.wa.gov/business/engineerslandsurveyors/index.html).

Additional information regarding the FE exam and a study guide are available on National Council of Examiners for Engineering and Surveying (NCEES) at [www.ncees.org/exams/fundamentals](http://www.ncees.org/exams/fundamentals).

### Preparation for Graduate School

#### Graduate School

If you are interested in continuing on to graduate school, you may want to explore graduate school options by looking at print and Web resources on college guides to graduate programs.

It is a good idea to request graduate program brochures and applications from several schools well in advance of applying to graduate school, so that you are aware of what the various schools are looking for and to make sure that you are meeting prerequisites. You might also want to talk to your faculty mentor to get recommendations for graduate program that would meet your needs and interests. As a rule of thumb, you should have your applications ready to send off by the beginning of January for admission the following academic year. (International students should be prepared to submit applications as early as November 1.)

### GRE

#### GRE Exam

Most graduate programs will require that you take the Graduate Record Examination (GRE). To get information about or register for the GRE exam, go to [www.gre.org](http://www.gre.org). Various GRE preparation books are available in bookstores and libraries.

### Employment

#### CEE Placement and Employer List

CEE students and graduates are sought by employers small and large, near and far, and they work locally and globally. For a list of companies and organizations that employ and recruit our students and graduates, please see the CEE Student Resources Website.

#### FERPA and the Release of Student Information

The Family Educational Rights and Privacy Act (FERPA) of 1974 protects the privacy of student education records. If a student has authorized "release of directory information," certain information (such as name, major, and email address) is available on the online UW Directory and may be shared with others (such as potential employers, etc.).

If a student has NOT authorized release of directory information, we may not release *\*any\** information about that student. When asked, we are advised to reply **"I have no information about that individual."** We will require written permission from you to release any information about you.

This applies to any third party inquiring about students, including parents, employers, friends, and alumni. Students who have *not* authorized release of directory information will not appear on the UW Directory, and the online UW Degree Validation service will also return a null search for those individuals. You can change your "directory release" status via MyUW. For more information on FERPA and release of directory information, see [www.washington.edu/students/reg/ferpa.html](http://www.washington.edu/students/reg/ferpa.html).

## Academic Timeline

### AUTUMN QUARTER 2009

- September 30 (Wednesday): Autumn Quarter begins.
- October 29 (Thursday): UW Engineering and Science Career Fair, HUB Ballrooms, noon – 5 pm. For information, see [www.uwseba.org/career-fair.html](http://www.uwseba.org/career-fair.html). This is a good time to start exploring options for summer internships and applying!
- If you attended another college, check to see that your most recent transcript has been sent to the UW and that the transfer credits are appropriately applied to your degree audit (DARS). If the credits have transferred but are not applied to the requirements you wish to have them cover, or if you have any questions or concerns, please email [ceadvice@u.washington.edu](mailto:ceadvice@u.washington.edu).
- November 18 (Wednesday): Construction Management Career Fair, noon, Gould Hall.
- November 6 – 29: Priority registration (Period I) for Winter Quarter.

### WINTER QUARTER 2010

- January 4 (Monday): Winter Quarter begins.
- January 15: Priority deadline for College of Engineering (CoE) Scholarships for the following year.
- January 28 (Thursday): CEE Career Fair (1pm - 4pm, HUB East Ballroom) Meet employers looking specifically for civil and environmental engineering students and graduates.
- Start looking for summer internships! Apply now!
- Watch for scholarship announcements from professional associations. These occur throughout the year, with varying deadlines.
- February 19 – March 7: Priority registration (Period I) for Spring Quarter.

### SPRING QUARTER 2009

- March 29 (Monday): Spring Quarter begins.
- Check your progress by running a fresh degree audit (DARS) via MyUW. This should be done on a quarterly-basis.
- Plan for your senior year! Review the Handbook for senior year courses.
- Look up next year's CEE courses. The CEE Student Resources Website has links to projected CEE course offerings list as well as the University's official Time Schedule.
- Update your engineering interest area(s) up to date! Update your CEE interest area at <https://catalysttools.washington.edu/webq/survey/ceadvice/58840>.

## Academic Timeline

### SPRING QUARTER 2010 (continued)

- *Faculty Mentoring:* Attend a senior-year planning session with faculty in the area(s) of your engineering interest, or meet individually with a faculty mentor. This is an opportunity to learn more about your area of engineering interest(s) and to plan for the future, including selecting appropriate courses for your senior year in preparation for autumn quarter registration. Be prepared for your faculty mentoring sessions by having reviewed your degree audit and having given some thought to your interests and goals (e.g., career pursuits, graduate school, research opportunities, etc.) **Have the faculty mentor sign your senior-year planning sheet and submit this to the CEE advising office for your file.** (Form is downloadable from the CEE Student Resources Website)
- April 1: Application deadline for CEE departmental scholarships for the following year.
- Mid April: Register for Summer Quarter, if desired. Check MyUW for registration dates.
- April 23-25 (Friday-Saturday) Engineering Open House. This huge event is open to the public. Volunteer to help run activities to showcase civil and environmental engineering for the extended community!
- Early May: Priority register for Autumn Quarter. Check MyUW for registration dates. (Summer Quarter registration begins April 19.)
- **Register for the "EIT" exam.** This test, officially known as the Fundamentals of Engineering (FE) exam, is administered by the Washington State Department of Licensing (DOL) twice a year (typically in October and April). The registration deadline is four months prior to the actual test date. So students typically register in spring quarter for the October test. Passing this test results in the "Engineer-in-Training" (EIT) license. For the actual test dates, application fees, and more information on the EIT, see the WA State DOL Website at [www.dol.wa.gov/business/engineerslandsurveyors/ellicense.html](http://www.dol.wa.gov/business/engineerslandsurveyors/ellicense.html).

### SUMMER QUARTER 2010

- June 21 (Monday): Summer Quarter begins.
- If you are planning to go to graduate school, prepare now. Study for the Graduate Records Examination (GRE, [www.gre.org](http://www.gre.org)). Students typically take the GRE (general exam) in autumn quarter (to apply to graduate school for admission the following autumn). Check with each graduate program of interest for admissions instructions and deadlines.

### AUTUMN QUARTER 2009

- September 29 (Wednesday): Autumn Quarter begins.
- October: Take the F.E. (aka "EIT") exam.
- **October/November: Apply to graduate!** If you intend to graduate in 2011, watch for CEE adviser's announcements for graduation application sessions. Sign-up online and attend to apply for graduation. Your graduation application will be prepared in advance and will require your review and signature. *Students who have applied for graduation will have Graduating Senior Priority (GSP) registration for following two quarters.*

## Academic Timeline

- Late October: UW Engineering and Science Career Fair. Start your post-graduation job search!
- Early November: Register for Winter Quarter. Students who have applied for graduation have Graduating Senior Priority (GSP) registration.

### WINTER QUARTER 2011

- January 3 (Monday): Winter Quarter begins.
- January 15: Application deadline for the UW CEE master's program for autumn 2011 admission. (For international students: Deadline is November 1.)
- Watch for the annual CEE Career Fair. This is your chance to meet with employers seeking civil and environmental engineering students and graduates. Apply now for post-graduation employment.
- Check your progress by running a fresh degree audit (DARS) via MyUW. Consult with the undergraduate adviser if you have any questions or concerns.
- Early February: Register for Spring Quarter. Students who have applied for graduation have Graduating Senior Priority (GSP) registration.
- If you did not take or pass the EIT exam in autumn, register now (4 months in advance) for the spring test.

### SPRING QUARTER 2011

- March 28 (Monday): Spring Quarter begins.
- April: Register to attend UW Commencement, and order cap & gown and tickets online (<http://uwgraduation.com>), if you wish to attend graduation ceremonies. Students who complete degrees between Summer 2010 and Summer 2011 are eligible to participate in UW Commencement.
- April/May: Sign up to attend the CEE Graduation Celebration by completing the online form (see CEE Student Resources Website). CEE Graduation Celebration occurs the same weekend as UW Commencement.
- June 11 (Saturday): UW Commencement Ceremony, approximately 1-4 pm, Husky Stadium.
- Ensure that your contact information is up-to-date. Diplomas are mailed to your permanent address approximately 2 months after date of graduation.
- Complete Exit Survey. (This will be sent to you electronically.)

# Planning Sheet

YEAR:

Autumn		Winter		Spring		Summer	

YEAR:

Autumn		Winter		Spring		Summer	

YEAR:

Autumn		Winter		Spring		Summer	

NOTES:

## Faculty Directory

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