

# Civil Engineering

<http://www.ccee.iastate.edu/>

Administered by the Department of Civil, Construction and Environmental Engineering

## Undergraduate Study

For undergraduate curriculum in civil engineering leading to the degree bachelor of science. This curriculum is accredited under the General Criteria and Civil Engineering Program Criteria by the Engineering Accreditation Commission of ABET, <http://www.abet.org>.

Civil engineers apply principles of motion and materials to plan, design, construct, maintain, and operate public and private facilities, while working under economic, social, and environmental constraints. Commonly included are transportation systems; bridges and buildings; water supply, pollution control, waste management, irrigation, and drainage systems; river and harbor improvements; dams and reservoirs. Civil engineering also includes planning, designing, and executing surveying operations and locating, delimiting, and delineating physical and cultural features on the earth's surface. Research, testing, sales, management, and related functions are also a part of civil engineering. Work on campus is supplemented by inspection trips, which furnish an opportunity for firsthand study of engineering systems in operation, as well as projects under construction.

Environmental engineering, as a specialty area in civil engineering, is concerned with protecting the public and natural health; providing an ample safe water supply; managing solid and hazardous waste; treating and disposing of domestic and industrial waste waters and waste; resource recovery; providing adequate drainage of urban and rural areas for sanitation; and controlling water quality, soil contamination, and air pollution. The environmental option for the civil engineering degree replaces some of the courses and electives in the general curriculum with further courses in chemistry, biology, and microbiology as well as specific topics in environmental engineering and design.

The civil engineering curriculum equips students with a broad education that includes technical skills in analysis and design and professional practices such as communication, teamwork, leadership, and ethics.

By three to five years after graduation, graduates of the civil engineering program will have:

1. Established themselves in successful careers in civil engineering or a related field.
2. Collaborated effectively on multi-disciplinary teams to address the needs of society and the environment.
3. Pursued lifelong learning, professional development, and registration as appropriate for their employers.

The faculty encourages the students to develop their professional skills by participating in cooperative education, internships, or progressive summer engineering employment. Qualified juniors and seniors interested in graduate studies may apply to the Graduate College to concurrently pursue the bachelor degree and either a master of science in Civil Engineering or a master of business administration in the College of Business Administration. These students would have an the opportunity to graduate in five years with both degrees.

## Graduate Study

The Department of Civil, Construction and Environmental Engineering offers work for the master of engineering, master of science, and doctor of philosophy degrees with a major in civil engineering with areas of specialization in structural engineering, environmental engineering, construction engineering and management, geotechnical engineering, civil engineering materials, and transportation engineering. The department also offers graduate minors of 9 to 15 credits of coursework to students from other engineering departments.

Candidates for the degrees of master of engineering and master of science are required to satisfactorily complete a total of 30 credits of acceptable graduate work. The master of engineering degree involves all course work. The master of science degree requires the preparation of a thesis or creative component.

Candidates for the doctor of philosophy degree refer to the department's home page and/or the department's Graduate Student Handbook for degree options and credit requirements. The normal prerequisite to major graduate work is the completion of a curriculum substantially equivalent to that required of engineering students at this university. However, because of the diversity of interests within the graduate programs in civil engineering, a student may qualify for graduate study even though undergraduate or prior graduate training has been in a discipline

other than engineering. Supporting work will be required depending upon the student's background and area of interest. A prospective graduate student is urged to specify the degree program and area of specialization in which he or she is interested on the application for admission. The department participates in the interdepartmental majors in transportation (master of science only), environmental science, and biorenewable resources and technology (see Index).

The Department of Civil, Construction and Environmental Engineering (CCEE Department) offers graduate certificates in construction management, environmental engineering, and environmental systems. The construction management certificate requires 12 credits, including nine credits of "core courses" and three credits of "elective courses" from approved CCEE Department lists.

For the environmental engineering and environmental systems certificates, each certificate requires the completion of four courses of three credits each and at least two of these courses shall be from an approved "core course" CCEE Department list and the remaining courses may be selected from an approved "elective courses" CCEE Department list. These courses are offered by different departments at Iowa State University. These two certificates also require the completion of a seminar course, C E 591 Seminar in Environmental Engineering, or any equivalent to be approved by the Environmental Engineering graduate faculty.

For additional requirements for these three certificates, refer to the document that describes each graduate certificate. These documents are available from the Department of Civil, Construction, and Environmental Engineering.

## Curriculum in Civil Engineering (General)

Administered by the Department of Civil, Construction and Environmental Engineering.

Leading to the degree bachelor of science.

**Total credits required: 129. Any transfer credit courses applied to the degree program require a grade of C or better. See also Basic Program and Special Programs. Note: Department does not allow Pass/Not Pass credits to be used to meet graduation requirements.**

**International Perspectives: 3 cr. <sup>1</sup>**

**U.S. Diversity: 3 cr. <sup>1</sup>**

### Communication Proficiency/Library requirement

ENGL 150	Critical Thinking and Communication (C or better in this course)	3
ENGL 250	Written, Oral, Visual, and Electronic Composition (C or better in this course)	3
LIB 160	Information Literacy	1

### Social Sciences and Humanities: 12 cr. <sup>2</sup>

Complete 12 cr. with 6 cr. at 200-level or above.

### Basic Program: 27 cr. <sup>3</sup>

A minimum GPA of 2.00 required for this set of courses, including any transfer courses. See Requirement for Entry into Professional Program in College of Engineering Overview section.

CHEM 177	General Chemistry I	4
ENGL 150	Critical Thinking and Communication	3
ENGL 250	Written, Oral, Visual, and Electronic Composition	3
ENGR 101	Engineering Orientation	R
C E 160	Engineering Problems with Computational Laboratory <sup>3</sup>	3
LIB 160	Information Literacy	1
MATH 165	Calculus I	4
MATH 166	Calculus II	4
PHYS 221	Introduction to Classical Physics I	5
<b>Total Credits</b>		<b>27</b>

### Math and Physical Science: 18 cr. (19 cr.)

CHEM 177L	Laboratory in General Chemistry I	1
CHEM 178 & 178L or PHYS 222	General Chemistry II and Laboratory in College Chemistry II <sup>4,5</sup>	4-5
GEOL 201	Geology for Engineers and Environmental Scientists	3

MATH 265	Calculus III	4
MATH 266	Elementary Differential Equations	3
Statistics Elective <sup>2</sup>		3

**Total Credits** 18-19

**C E Engineering Core: 30 cr. Minimum GPA of 2.00 required for this set of courses to graduate (including transfer courses).**

E M 274	Statics of Engineering	3
E M 324	Mechanics of Materials	3
E M 345	Dynamics	3
E M 378	Mechanics of Fluids	3
C E 206	Engineering Economic Analysis and Professional Issues in Civil Engineering	3
C E 326	Principles of Environmental Engineering	3
C E 332	Structural Analysis I	3
C E 355	Principles of Transportation Engineering	3
C E 360	Geotechnical Engineering	3
C E 372	Engineering Hydrology and Hydraulics	3

**Total Credits** 30

**Other Remaining Courses: 42 cr.**

C E 105	Introduction to the Civil Engineering Profession	1
C E 111	Fundamentals of Surveying I	3
C E 170	Graphics for Civil Engineering	2
C E 306	Project Management for Civil Engineers	3
Any two of the following three courses:		6
C E 333	Structural Steel Design I	
C E 334	Reinforced Concrete Design I	
C E 460	Foundation Engineering	
C E 382	Design of Concretes	3
C E 485	Civil Engineering Design	3
E M 327	Mechanics of Materials Laboratory	1
SP CM 212	Fundamentals of Public Speaking	3
Civil Engineering Design Elective <sup>2</sup>		3
Technical Communication Elective <sup>2</sup>		3
Engineering Topics Electives <sup>2</sup>		11

**Total Credits** 42

**Seminar/Co-op/Internships: R cr.**

C E 403	Program and Outcome Assessment	R
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### Notes.

1. These university requirements will add to the minimum credits of the program unless the university-approved courses are also approved by the department to meet other course requirements within the degree program. U.S. diversity and international perspectives courses may not be taken Pass/Not Pass.
2. Choose from department approved list.
3. See Basic Program for Professional Engineering Curricula for accepted substitutions for curriculum designated courses in the Basic Program.
4. Students who opt for PHYS 222 Introduction to Classical Physics II rather than CHEM 178 General Chemistry II, CHEM 178L Laboratory in College Chemistry II will complete 19 cr. here which will increase the total number of credits required by 1.
5. Students who transfer in with CHEM 167/CHEM 167L will be able to take CHEM 178/CHEM 178L to complete the program's Chemistry requirement.

## Curriculum in Civil Engineering with Environmental Option

Administered by the Department of Civil, Construction and Environmental Engineering.

Leading to the degree bachelor of science.

**Total credits required: 130. Any transfer credit courses applied to the degree program require a grade of C or better. See also Basic Program and Special Programs.**

**International Perspectives: 3 cr.<sup>1</sup>**

**U.S. Diversity: 3 cr.<sup>1</sup>**

**Communication Proficiency/Library requirement:**

ENGL 150	Critical Thinking and Communication (C or better in this course)	3
ENGL 250	Written, Oral, Visual, and Electronic Composition (C or better in this course)	3
LIB 160	Information Literacy	1

**Social Sciences and Humanities: 12 cr.<sup>2</sup>**

Complete 12 cr. with 6 cr. at 200-level or above.

**Basic Program: 27 cr.<sup>3</sup>. Minimum GPA of 2.00 required for this set of courses to graduate (including transfer courses).**

CHEM 177	General Chemistry I	4
ENGL 150	Critical Thinking and Communication	3
ENGL 250	Written, Oral, Visual, and Electronic Composition	3
ENGR 101	Engineering Orientation	R
C E 160	Engineering Problems with Computational Laboratory <sup>3</sup>	3
LIB 160	Information Literacy	1
MATH 165	Calculus I	4
MATH 166	Calculus II	4
PHYS 221	Introduction to Classical Physics I	5

**Total Credits** 27

**Math and Physical Science: 27 cr.**

CHEM 177L	Laboratory in General Chemistry I	1
CHEM 178	General Chemistry II <sup>5</sup>	3
CHEM 178L	Laboratory in College Chemistry II <sup>5</sup>	1
BIOL 173	Environmental Biology	3
or BIOL 211	Principles of Biology I	
CHEM 231	Elementary Organic Chemistry	3
CHEM 231L	Laboratory in Elementary Organic Chemistry	1
GEOL 201	Geology for Engineers and Environmental Scientists	3
MATH 265	Calculus III	4
MATH 266	Elementary Differential Equations	3
MICRO 201	Introduction to Microbiology	2
Statistics Elective <sup>2</sup>		3

**Total Credits** 27

**C E/Env Engineering Core: 27 cr. Minimum GPA of 2.00 required for this set of courses to graduate (including transfer courses).**

E M 274	Statics of Engineering	3
E M 324	Mechanics of Materials	3
E M 378	Mechanics of Fluids	3
C E 206	Engineering Economic Analysis and Professional Issues in Civil Engineering	3
C E 326	Principles of Environmental Engineering	3
C E 332	Structural Analysis I	3
C E 355	Principles of Transportation Engineering	3
C E 360	Geotechnical Engineering	3
C E 372	Engineering Hydrology and Hydraulics	3

**Total Credits** 27

**Other Remaining Courses: 37 cr.**

C E 105	Introduction to the Civil Engineering Profession	1
C E 111	Fundamentals of Surveying I	3
C E 170	Graphics for Civil Engineering	2
C E 306	Project Management for Civil Engineers	3
C E 334	Reinforced Concrete Design I	3

C E 382	Design of Concretes	3
C E 420	Environmental Engineering Chemistry	3
C E 421	Environmental Biotechnology	3
C E 428	Water and Wastewater Treatment Plant Design	3
C E 485	Civil Engineering Design	3
E M 327	Mechanics of Materials Laboratory	1
SP CM 212	Fundamentals of Public Speaking	3
Civil Engineering Design Elective <sup>2</sup>		3
Technical Communication Elective <sup>2</sup>		3
<b>Total Credits</b>		<b>37</b>

**Seminar/Co-op/Internships: R cr.**

C E 403	Program and Outcome Assessment	R
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**Co-op/Internship optional.****Notes.**

1. These university requirements will add to the minimum credits of the program unless the university-approved courses are also approved by the department to meet other course requirements within the degree program. U.S. diversity and international perspectives courses may not be taken Pass/Not Pass.
2. Choose from department approved list. (<http://www.ccee.iastate.edu/academics/advising/civil-engineering-student-forms>)
3. See Basic Program for Professional Engineering Curricula for accepted substitutions for curriculum designated courses in the Basic Program.
4. Students who transfer in with CHEM 167 General Chemistry for Engineering Students/CHEM 167L Laboratory in General Chemistry for Engineering will be able to take CHEM 178 General Chemistry II/CHEM 178L Laboratory in College Chemistry II to complete the program's Chemistry requirement.

See also: A 4-year plan of study grid showing course template by semester for Civil Engineering