CIVIL ENGINEERING

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

Administered by the Department of Civil, Construction and Environmental Engineering

For undergraduate curriculum in civil engineering leading to the degree bachelor of science. The Civil Engineering program is accredited 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 an emphasis 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 wastewaters 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 emphasis 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.

Student Learning Outcomes

Graduates of the civil engineering curriculum should have, at the time of graduation:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
3. an ability to communicate effectively with a range of audiences
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Program Educational Objectives

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

1. Pursued successful careers and expertise in civil engineering or a related profession.
2. Collaborated effectively on multi-disciplinary teams to address the needs of society and the environment.
3. Pursued lifelong learning, professional development, and licensure as appropriate for their career goals.

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.

The faculty encourages the students to develop their professional skills by participating in cooperative education, internships, or progressive summer engineering employment and study abroad programs. 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 the opportunity to graduate in five years with both degrees.

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 (but will not be calculated into the ISU cumulative GPA, Basic Program GPA or Core GPA). 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. [1]
U.S. Diversity: 3 cr. [1]
Communication Proficiency/Library requirement

ENGL 150	Critical Thinking and Communication (Must have a C or better in this course)	3

ENGL 250	Written, Oral, Visual, and Electronic Composition (Must have a C or better in this course)	3
LIB 160	Introduction to College Level Research	1

Social Sciences and Humanities: 12 cr. [2]

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

Basic Program: 24 cr. [3]

A minimum GPA of 2.00 required for this set of courses (please note that transfer course grades will not be calculated into the Basic Program GPA). See Requirement for Entry into Professional Program in College of Engineering Overview section.

CHEM 167	General Chemistry for Engineering Students	4
or CHEM 177 & CHEM 178	General Chemistry I and General Chemistry II	
ENGL 150	Critical Thinking and Communication (Must have a C or better in this course)	3
ENGR 101	Engineering Orientation	R
C E 160	Engineering Problems with Computational Laboratory [3]	3
LIB 160	Introduction to College Level Research	1
MATH 165	Calculus I	4
MATH 166	Calculus II	4
PHYS 231	Introduction to Classical Physics I	4
PHYS 231L	Introduction to Classical Physics I Laboratory	1
Total Credits		**24**

Math and Physical Science: 18 cr.

CHEM 167L	Laboratory in General Chemistry for Engineering	1
or CHEM 177L	Laboratory in General Chemistry I	
CHEM 178 & 178L	General Chemistry II and Laboratory in College Chemistry II [4]	4-5
or PHYS 232 & 232L	Introduction to Classical Physics II and Introduction to Classical Physics II Laboratory	
GEOL 201	Geology for Engineers and Environmental Scientists	3
MATH 265	Calculus III	4
MATH 266	Elementary Differential Equations	3
Statistics Elective [2]		3
Total Credits		**18-19**

Civil Engineering Core: 31 cr. Minimum GPA of 2.00 required for this set of courses to graduate (including transfer courses; please note that transfer course grades will not be calculated into the Core GPA).

C E 274	Engineering Statics	3
E M 324	Mechanics of Materials	3
M E 345	Engineering Dynamics	3
C E 206	Engineering Economic Analysis and Professional Issues in Civil Engineering	3
C E 326	Principles of Environmental Engineering	3
A B E 378	Mechanics of Fluids	3
C E 332	Structural Analysis I	3
C E 355	Principles of Transportation Engineering	3
C E 360	Geotechnical Engineering	4
C E 372	Engineering Hydrology and Hydraulics	3
Total Credits		**31**

Other Remaining Courses: 44 cr.

C E 120	Civil Engineering Learning Community	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
ENGL 250	Written, Oral, Visual, and Electronic Composition (Must have a C or better in this course)	3
SP CM 212	Fundamentals of Public Speaking	3
Civil Engineering Design Elective [2]		3
Technical Communication Elective [2]		3
Engineering Topics Electives [2]		10
Total Credits		**44**

Seminar/Co-op/Internships: R cr.

C E 403	Program and Outcome Assessment	R

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/). At least six of eleven credits must be C E or Con E courses for the Engineering Topics Electives.
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/CHEM 167L will be able to take CHEM 178/CHEM 178L to complete the program's Chemistry requirement.

See also: A 4-year plan of study grid showing course template by semester for Civil Engineering (http://catalog.iastate.edu/previouscatalogs/2022-2023/collegeofengineering/civilengineering/#fouryearplantext)

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: 131. Any transfer credit courses applied to the degree program require a grade of C or better (but will not be calculated into the ISU cumulative GPA, Basic Program GPA or Core GPA). See also Basic Program and Special Programs.
International Perspectives: 3 cr. [1]
U.S. Diversity: 3 cr. [1]
Communication Proficiency/Library requirement:

ENGL 150	Critical Thinking and Communication (Must have a C or better in this course)	3
ENGL 250	Written, Oral, Visual, and Electronic Composition (Must have a C or better in this course)	3
LIB 160	Introduction to College Level Research	1

Social Sciences and Humanities: 12 cr. [2]
Complete 12 cr. with 6 cr. at 200-level or above.

Basic Program: 24 cr [3]**. Minimum GPA of 2.00 required for this set of courses to graduate, including any transfer courses (please note that transfer course grades will not be calculated into the Basic Program GPA).**

CHEM 177	General Chemistry I	4
ENGL 150	Critical Thinking and Communication (Must have a C or better in this course)	3
ENGR 101	Engineering Orientation	R
C E 160	Engineering Problems with Computational Laboratory [3]	3
LIB 160	Introduction to College Level Research	1
MATH 165	Calculus I	4
MATH 166	Calculus II	4
PHYS 231	Introduction to Classical Physics I	4
PHYS 231L	Introduction to Classical Physics I Laboratory	1
Total Credits		**24**

Math and Physical Science: 27 cr.

CHEM 177L	Laboratory in General Chemistry I	1
CHEM 178	General Chemistry II [4]	3
CHEM 178L	Laboratory in College Chemistry II [4]	1
CHEM 231	Elementary Organic Chemistry	3
BIOL 251	Biological Processes in the Environment	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 [2]		3
Total Credits		**27**

Civil/Env Engineering Core: 28 cr. Minimum GPA of 2.00 required for this set of courses to graduate (including transfer courses; please note that transfer course grades will not be calculated into the Core GPA).

C E 274	Engineering Statics	3
E M 324	Mechanics of Materials	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
A B E 378	Mechanics of Fluids	3
C E 355	Principles of Transportation Engineering	3
C E 360	Geotechnical Engineering	4
C E 372	Engineering Hydrology and Hydraulics	3
Total Credits		**28**

Other Remaining Courses: 39 cr.

C E 120	Civil Engineering Learning Community	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
ENGL 250	Written, Oral, Visual, and Electronic Composition (Must have a C or better in this course)	3
SP CM 212	Fundamentals of Public Speaking	3
Civil Engineering Design Elective [2]		3
Technical Communication Elective [2]		3
Total Credits		**40**

Seminar/Co-op/Internships: R cr.

C E 403	Program and Outcome Assessment	R

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/) At least six of eleven credits must be C E or Con E courses for the Engineering Topics Electives.
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 (http://catalog.iastate.edu/previouscatalogs/2022-2023/collegeofengineering/civilengineering/#fouryearplantext)

Civil Engineering, B.S. - environmental specialization

First Year

Fall	Credits	Spring	Credits
C E 160	3	C E 170	2
CHEM 177	4	MATH 166	4
CHEM 177L	1	PHYS 231	4
ENGL 150	3	PHYS 231L	1
MATH 165	4	SSH Elective	3
ENGR 101	R	C E 120	1
	15		**15**

Second Year

Fall	Credits	Spring	Credits
ENGL 250	3	C E 111	3
C E 274	3	C E 206	3
CHEM 178	3	C E 306	3
CHEM 178L	1	E M 324	3
MATH 265	4	MATH 266	3
GEOL 201	3	Statistics Elective	3
LIB 160	1		
	18		**18**

Third Year

Fall	Credits	Spring	Credits
C E 332	3	C E 326	3
C E 355	3	C E 334	3
C E 382	3	SP CM 212	3
A B E 378	3	C E 372	3
E M 327	1	BIOL 251	3
CHEM 231	3	Technical Communication Elective	3
CHEM 231L	1		
	17		**18**

Fourth Year

Fall	Credits	Spring	Credits
ENV E 426X	3	C E 403	R
MICRO 201	2	ENV E 427X	3
C E 360	4	C E 428	3
SSH Elective	6	C E 485	3
C E Design Elective	3	SSH Electives	3
	18		**12**

Civil Engineering, B.S. - GENERAL Program

First Year

Fall	Credits	Spring	Credits
C E 160	3	C E 170	2
CHEM 177	4	MATH 166	4
CHEM 177L	1	SP CM 212	3
ENGL 150	3	PHYS 231	4
MATH 165	4	PHYS 231L	1
ENGR 101	R		
C E 120	1		
	16		**14**

Second Year

Fall	Credits	Spring	Credits
ENGL 250	3	E M 324	3
CHEM 178	3	MATH 266	3
CHEM 178L	1	C E 306	3
C E 274	3	Statistics Elective	3
MATH 265	4	A B E 378	3
GEOL 201	3	C E 111	3

LIB 160	1		
	18		**18**

Third Year

Fall	Credits	Spring	Credits
C E 332	3	C E 334 (CE 460 may be substituted for CE 333 or CE 334)	3
M E 345	3	C E 372	3
C E 360	4	C E 382	3
E M 327	1	Engr Topic Elective	2
Technical Communication	3	SSH Elective	3
C E 206	3	C E 355	3
	17		**17**

Fourth Year

Fall	Credits	Spring	Credits
C E 333 (CE 460 may be substituted for CE 333 or CE 334)	3	C E 403	R
Engr Topic Elective	5	C E 485	3
SSH Elective	6	CE Design Elective	3
C E 326	3	Engr Topic Elective	3
		SSH Elective	3
	17		**12**

A concurrent bachelor of science/master of science (B.S./M.S.) degree program is available to qualified seniors at Iowa State University.

Go to: https://www.ccee.iastate.edu/prospective-graduate-students/concurrent-programs/ for more information.

Graduate Study

The Department of Civil, Construction and Environmental Engineering offers graduate programs for the degrees of master of engineering, master of science, and doctor of philosophy with a major in civil engineering with areas of specialization in structural engineering, environmental engineering, construction engineering and management, geotechnical engineering, civil engineering materials, transportation engineering, and intelligent infrastructure 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 complete a total of 30 acceptable graduate credits. 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 are required to complete a minimum of 72 acceptable graduate credits. Normal prerequisite for major graduate work in civil engineering is the completion of an undergraduate curriculum substantially equivalent to that required of engineering students at this university. Due to 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. The department participates in the interdepartmental graduate programs in transportation, environmental science, and wind energy science, engineering and policy.

The department also offers graduate certificates in construction management, environmental engineering, and environmental systems. The construction management certificate requires 12 graduate credits (nine credits of "core courses" and three credits of approved "elective courses").

The environmental engineering or environmental systems certificate requires 12 graduate credits (six credits of "core courses", six credits of approved "elective courses") and a seminar course or an approved equivalent.

Additional information about graduate programs, research and admission criteria are available on the department's website http://www.ccee.iastate.edu/academics/graduate/.