CONSTRUCTION ENGINEERING

Administered by the Department of Civil, Construction and Environmental Engineering

The curriculum in construction engineering, leading to a bachelor of science degree can be referenced here: www.catalog.iastate.edu/collegeofengineering/constructionengineering/#curriculumtext (http://catalog.iastate.edu/previouscatalogs/2022-2023/collegeofengineering/constructionengineering/#curriculumtext). The Construction Engineering program is accredited by the Engineering Accreditation Commission of ABET, http://www.abet.org.

Student Learning Outcomes

Graduates of the construction 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: Three to five years after graduation, our graduates will have pursued successful careers and expertise in construction engineering or a related profession. They will collaborate effectively on multi-disciplinary teams to address the needs of society and the environment. They will pursue lifelong learning, professional development, and licensure as appropriate for their career goals.

Students who successfully complete the curriculum will be prepared for entry into the field or for further study at the graduate level in construction engineering or related fields of study, such as law, business, and/or other engineering disciplines.

Construction engineers need to possess a strong fundamental knowledge of engineering design and management principles, including knowledge of business procedures, economics, and human behavior. Graduates of this curriculum may expect to engage in design of temporary structures, coordination of project design, systems design, cost estimating, planning and scheduling, company and project management, materials procurement, equipment selection, and cost control. With the emergence of integrated project delivery methods such as design-build construction, the role of the construction engineer is expanding the need for trained professionals that understand both aspects of the project delivery environment. The curriculum offers opportunities to study emphases concerned with building, heavy, mechanical, or electrical construction. The process of construction involves the organization, administration, and coordination of labor resource requirements, temporary and permanent materials, equipment, supplies and utilities, money, technology and methods. These must be integrated in the most efficient manner possible to complete construction projects on schedule, within the budget, and according to the standards of quality and performance specified by the project owner or designer. The curriculum blends engineering, management and business sciences into a study of the processes of construction whereby designer's plans and specifications are converted into physical structures and facilities.

The curriculum develops the ability of students to be team workers, creative thinkers, and effective communicators. This is achieved by encouraging students to:

- interact with practicing professionals
- gain work experience during summer jobs, internship, and cooperative education assignments that emphasize the knowledge required of construction engineers
- develop leadership skills by participating in student organizations
- develop, analyze, and interpret alternative solutions to open-ended problems
- study abroad

The construction industry is becoming increasingly global. Courses in humanities, social sciences, U.S. diversity, and international perspectives are included in the curriculum to broaden the student's perspective of the work environment. In addition, the department has several exchange program opportunities for students to participate in study abroad programs.

Qualified construction engineering students within 30 credits of completing their degree may apply for concurrent enrollment in the

Graduate College. See Civil Engineering (http://www.ccee.iastate.edu/academics/graduate/) Graduate Study for more information.

Curriculum in Construction Engineering

Administered by the Department of Civil, Construction and Environmental Engineering; leading to the degree bachelor of science.

Total credits required: Building Option -128.0, Heavy Option - 127.0, Electrical - 127.0, Mechanical - 127.0 cr.

The Construction Engineering program requires a grade of a C or better for any transfer credit course that is applied to the degree program (but will not be calculated into the ISU cumulative GPA, Basic Program GPA or Core GPA). Note: Department does not allow Pass/Not Pass credits to be used to meet graduation requirements for either required or elective courses.

International Perspectives: 3 cr. [1]
U.S. Diversity: 3 cr. [1]
Communication Proficiency/Library requirements:

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
Business Communication Elective: one course of the following with a minimum grade of C.		3
ENGL 302	Business Communication	
ENGL 309	Proposal and Report Writing	
ENGL 314	Technical Communication	
Total Credits		**10**

Social Sciences and Humanities: 12 cr.

Social Sciences and Humanities [2]		6
International Perspectives [1]		3
U.S. Diversity [1]		3
Total Credits		**12**

Basic Program: 24 cr. [3]

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

CHEM 167	General Chemistry for Engineering Students	4
or CHEM 177	General Chemistry I	
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: 12 cr.

STAT 305	Engineering Statistics	3
or STAT 231	Probability and Statistical Inference for Engineers	
MATH 267	Elementary Differential Equations and Laplace Transforms	4
PHYS 232	Introduction to Classical Physics II	4
PHYS 232L	Introduction to Classical Physics II Laboratory	1
Total Credits		**12**

Construction Engineering Core: 27 cr. (B, H); 28 cr. (E, M). Minimum 2.00 GPA for this set of courses to graduate (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
CON E 422	Construction Cost Estimating and Cost Engineering	3
CON E 441	Construction Planning, Scheduling, and Control	3
C E 332	Structural Analysis I	3
A B E 378	Mechanics of Fluids	3
See options for remaining core courses		9-10
Total Credits		**27-28**

Select remaining courses from one of the following options:

Building Option: Remaining Core courses 10 cr.

C E 360	Geotechnical Engineering	4
CON E 322	Construction Equipment and Heavy Construction Methods	3
CON E 340	Concrete and Steel Construction	3
Total Credits		**10**

Building Option: Remaining courses 17 cr.

C E 333	Structural Steel Design I	3
C E 334	Reinforced Concrete Design I	3
C E 383	Design of Portland Cement Concrete	1
CON E 352	Mechanical Systems in Buildings	3
CON E 353	Electrical Systems in Buildings	3
E M 327	Mechanics of Materials Laboratory	1
Engineering Topics Elective [2]		3
Total Credits		**17**

Heavy Option: Remaining Core courses 10 cr.

C E 360	Geotechnical Engineering	4
CON E 322	Construction Equipment and Heavy Construction Methods	3
CON E 340	Concrete and Steel Construction	3
Total Credits		**10**

Heavy Option: Remaining courses 16 cr.

C E 333	Structural Steel Design I	3
C E 334	Reinforced Concrete Design I	3
C E 382	Design of Concretes	3
E M 327	Mechanics of Materials Laboratory	1
Engineering Topics Electives [2]		6
Total Credits		**16**

Electrical Option: Remaining Core courses 10 cr.

E E 230	Electronic Circuits and Systems	4
E E 303	Energy Systems and Power Electronics	3
E E 456	Power System Analysis I	3
Total Credits		**10**

Electrical Option: Remaining courses 16 cr.

CON E 352	Mechanical Systems in Buildings	3
CON E 353	Electrical Systems in Buildings	3
E E 201	Electric Circuits	4
E E 457	Power System Analysis II	3
Engineering Topics Elective [2]		3
Total Credits		**16**

Mechanical Option: Remaining Core courses 10 cr.

M E 231	Engineering Thermodynamics I	3
M E 436	Heat Transfer	4
M E 441	Fundamentals of Heating, Ventilating, and Air Conditioning	3
Total Credits		**10**

Mechanical Option: Remaining courses 16 cr.

CON E 352	Mechanical Systems in Buildings	3
CON E 353	Electrical Systems in Buildings	3
E E 442	Introduction to Circuits and Instruments	2
E E 448	Introduction to AC Circuits and Motors	2
M E 442	Heating and Air Conditioning Design	3
Engineering Topics Elective [2]		3
Total Credits		**16**

Additional Required Courses: 35 cr.

CON E 121	Cornerstone Learning Community: Orientation to Academic Life	1
CON E 122	Cornerstone Learning Community: Orientation to Professional Life	1
C E 170	Graphics for Civil Engineering	2
C E 111	Fundamentals of Surveying I	3
CON E 222	Contractor Organization and Management of Construction	3
I E 305	Engineering Economic Analysis	3
CON E 241	Construction Materials and Methods	3
CON E 251	Mechanical/Electrical Materials and Methods	1
ENGL 250	Written, Oral, Visual, and Electronic Composition (Must have a C or better in this course)	3
Law Elective		3
CON E 380	Engineering Law	
ACCT 215	Legal Environment of Business	
CON E 487	Construction Engineering Design I	3
CON E 488	Construction Engineering Design II	3
Business Communication Elective (minimum grade of C)		3
ENGL 302	Business Communication	
ENGL 309	Proposal and Report Writing	
ENGL 314	Technical Communication	
Complete one course from Math or Stat Elective [2]		3
Total Credits		**35**

Co-op/Internships - Optional

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/construction-engineering-student-forms/).
3. See Basic Program for Engineering Curricula (http://catalog.iastate.edu/previouscatalogs/2022-2023/collegeofengineering/#basicprogramcurriculatext) for accepted substitutions for curriculum designated courses in the Basic Program https://www.engineering.iastate.edu/classification/students/basic-program/

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

See also: A 4-year plan of study grid showing course template by semester for an electrical emphasis in Construction Engineering. (http://

catalog.iastate.edu/previouscatalogs/2022-2023/collegeofengineering/constructionengineering/#fouryearplanselectricalemphasistext)

See also: A 4-year plan of study grid showing course template by semester for a heavy/highway emphasis in Construction Engineering. (http://catalog.iastate.edu/previouscatalogs/2022-2023/collegeofengineering/constructionengineering/#fouryearplanheavyhighwayemphasistext)

See also: A 4-year plan of study grid showing course template by semester for a mechanical emphasis in Construction Engineering. (http://catalog.iastate.edu/previouscatalogs/2022-2023/collegeofengineering/constructionengineering/#fouryearplanmechanicalemphasistext)

Construction Engineering, B.S. building emphasis

First Year

Fall	Credits	Spring	Credits
CON E 121	1	CON E 122	1
C E 160	3	C E 170	2
MATH 165	4	MATH 166	4
CHEM 167	4	ENGL 250	3
ENGL 150	3	PHYS 231	4
ENGR 101	R	PHYS 231L	1
		LIB 160	1
	15		**16**

Second Year

Fall	Credits	Spring	Credits
CON E 222	3	CON E 241	3
C E 111	3	CON E 251	1
Math or Stat Elective	3	MATH 267	4
SSH Elective	3	C E 274	3
PHYS 232	4	I E 305	3
PHYS 232L	1		
	17		**14**

Third Year

Fall	Credits	Spring	Credits
CON E 322	3	CON E 340	3
CON E 352	3	Law Elective (ConE 380 or Acct 215)	3
CON E 353	3	C E 360	4
STAT 231 or 305	3	C E 332	3
E M 324	3	A B E 378	3
SSH Elective	3	E M 327	1
	18		**17**

Fourth Year

Fall	Credits	Spring	Credits
CON E 422	3	CON E 487	3
CON E 441	3	CON E 488	3
C E 383	1	Business Comm Elective (ENGL 302 or 309 or 314)	3
C E 333	3	C E 334	3
Engr Topics Elective	3	SSH Elective (International Perspective)	3
SSH Elective (US Diversity)	3		
	16		**15**

Construction Engineering, B.S. electrical emphasis

First Year

Fall	Credits	Spring	Credits
CON E 121	1	CON E 122	1
C E 160	3	C E 170	2
MATH 165	4	MATH 166	4
CHEM 167	4	ENGL 250	3
ENGL 150	3	PHYS 231	4
ENGR 101	R	PHYS 231L	1
		LIB 160	1
	15		**16**

Second Year

Fall	Credits	Spring	Credits
CON E 222	3	CON E 241	3
C E 111	3	CON E 251	1
MATH or STAT Elective	3	MATH 267	4
SSH Elective	3	C E 274	3
PHYS 232	4	I E 305	3
PHYS 232L	1		
	17		**14**

Third Year

Fall	Credits	Spring	Credits
CON E 352	3	Law Elective (ConE 380 or Acct 215)	3
CON E 353	3	E E 230	4
STAT 231 or 305	3	E E 303	3
E M 324	3	A B E 378	3
E E 201	4	SSH Elective	3
	16		**16**

Fourth Year

Fall	Credits	Spring	Credits
CON E 422	3	CON E 487	3
CON E 441	3	CON E 488	3
E E 456	3	E E 457	3
C E 332	3	Business Comm Elective (ENGL 302 or 309 or 314)	3
Engineering Topics Elective	3	SSH Elective (International Perspective)	3
SSH Elective (US Diversity)	3		
	18		**15**

Construction Engineering, B.S. heavy/highway emphasis

First Year

Fall	Credits	Spring	Credits
CON E 121	1	CON E 122	1
C E 160	3	C E 170	2
MATH 165	4	MATH 166	4
CHEM 167	4	ENGL 250	3
ENGL 150	3	PHYS 231	4
ENGR 101	R	PHYS 231L	1
		LIB 160	1
	15		**16**

Second Year

Fall	Credits	Spring	Credits
CON E 222	3	CON E 241	3
C E 111	3	CON E 251	1
Math or Stat Elective	3	MATH 267	4
SSH Elective	3	C E 274	3
PHYS 232	4	I E 305	3
PHYS 232L	1		
	17		**14**

Third Year

Fall	Credits	Spring	Credits
CON E 322	3	CON E 340	3
Law Elective (ConE 380 or Acct 215)	3	C E 332	3
STAT 231 or 305	3	C E 360	4
E M 324	3	C E 382	3
A B E 378	3	E M 327	1
SSH Elective	3	SSH Elective (US Diversity)	3
	18		**17**

Fourth Year

Fall	Credits	Spring	Credits
CON E 441	3	CON E 487	3
Engineering Topics Elective	3	CON E 488	3
CON E 422	3	Engineering Topics Elective	3
C E 333	3	C E 334	3
SSH Elective (International Perspective)	3	Business Comm Elective (ENGL 302 or 309 or 314)	3
	15		**15**

Construction Engineering, B.S. mechanical emphasis

First Year

Fall	Credits	Spring	Credits
CON E 121	1	CON E 122	1
C E 160	3	C E 170	2
MATH 165	4	MATH 166	4
CHEM 167	4	ENGL 250	3
ENGL 150	3	PHYS 231	4
ENGR 101	R	PHYS 231L	1
		LIB 160	1
	15		**16**

Second Year

Fall	Credits	Spring	Credits
CON E 222	3	CON E 241	3
C E 111	3	CON E 251	1
Math/Stat Elective	3	MATH 267	4
SSH Elective	3	C E 274	3
PHYS 232	4	I E 305	3
PHYS 232L	1		
	17		**14**

Third Year

Fall	Credits	Spring	Credits
CON E 352	3	Law Elective (ConE 380 or Acct 215)	3
CON E 353	3	E E 442	2
STAT 231 or 305	3	E E 448	2
E M 324	3	C E 332	3
M E 231	3	A B E 378	3
SSH Elective	3	SSH Elective (US Diversity)	3
	18		**16**

Fourth Year

Fall	Credits	Spring	Credits
CON E 422	3	CON E 487	3

CON E 441	3	CON E 488	3
M E 436	4	M E 442	3
M E 441	3	Business Comm Elective (ENGL 302 or 309 or 314)	3
Engineering Topics Elective	3	SSH Elective (International Perspective)	3
	16		**15**

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 further information.

Graduate Study

An area of specialization in construction engineering and management is offered within the graduate program of the Department of Civil, Construction and Environmental Engineering. This specialization focuses on project management including and beyond the traditional iron triangle of scope, technical, and schedule to include context and financing, enabling project management of more complex projects. Three graduate degrees including, Master of Engineering (30 credits), Master of Science (30 credits), and Doctor of Philosophy (72 credits) are offered. The Master of Engineering degree is a coursework only option and the other degree programs require a research component at a level adjusted to the degree sought. All degrees are offered on-campus and some degrees may be completed off-campus through distance education. All degrees require C E 501, C E 502, C E 503, and nine credits additional credits within construction focused C E courses. Course options include but are not limited to:

C E 501	Preconstruction Project Engineering and Management	3
C E 502	Construction Project Engineering and Management	3
C E 503	Construction Finance and Business Management	3
C E 505	Design of Construction Systems	3
C E 594A	Special Topics Construction Engineering and Mgt.: Planning and Scheduling	3
C E 594L	Spl Topics Construction Engr and Mgt.: Adv Building Construction Topics - LEED for New Construction	3

Undergraduate students may also qualify for the concurrent bachelor of science/master of science (BS/MS) degree program. Courses are offered for minor work to students taking major work in other curricula or in interdepartmental programs. A graduate certificate is also available which requires 12 credits of coursework. Courses required for the certificate are C E 501, C E 502, and C E 503. For additional information see Civil Engineering, Graduate Programs, https://www.ccee.iastate.edu/academics/graduate/.