CONSTRUCTION ENGINEERING

Administered by the Department of Civil, Construction and Environmental Engineering

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

Construction engineering is a curriculum administered by the Department of Civil, Construction and Environmental Engineering. For details of the curriculum in construction engineering leading to the degree bachelor of science see the Construction Engineering Curriculum: http://catalog.iastate.edu/collegeofengineering/constructionengineering/#curriculumtext . By three to five years after graduation, graduates of the construction engineering program will have:

1. Established themselves in successful careers in construction 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.

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 other engineering disciplines.

Construction engineers need to possess 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 providing students with opportunities 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. Interested and qualified students have the opportunity to participate in the cooperative education program or internship program to supplement academic work with work experience.

Construction engineering students are encouraged to participate in life-long learning, continuous professional development, and to achieve professional engineer registration and/or registration as a certified professional constructor. 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 -125.0, Heavy Option - 125.0, Electrical - 124.0, Mechanical - 125.0 cr.
The Construction Engineering Department 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.

See also Basic Program and Special Programs.

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

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
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	

Social Sciences and Humanities: 12 cr.

One of the following		3
PSYCH 101	Introduction to Psychology	
PSYCH 230	Developmental Psychology	

PSYCH 250	Psychology of the Workplace	
PSYCH 280	Social Psychology	
SOC 134	Introduction to Sociology	
ECON 101	Principles of Microeconomics	3
or ECON 102	Principles of Macroeconomics	
International Perspectives [2]		3
U.S. Diversity approved list [2]		3
Total Credits		**12**

Basic Program: 27 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). See Requirement for Entry into Professional Program in College of Engineering Overview section.

CHEM 167	General Chemistry for Engineering Students	4
or CHEM 177	General Chemistry I	
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 [3]	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: 11 cr. (B, H); 12 cr. (E, M).

STAT 105	Introduction to Statistics for Engineers	3
MATH 266	Elementary Differential Equations (B, H)	3
MATH 267	Elementary Differential Equations and Laplace Transforms (E, M)	4
PHYS 222	Introduction to Classical Physics II	5

Construction Engineering Core: 27 cr. (B, H); 28 cr. (E, M). Minimum 2.00 GPA for this set of courses to graduate including any transfer courses (please note that transfer course grades will not be calculated into the Core GPA):

E M 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
E M 378	Mechanics of Fluids	3
C E 332	Structural Analysis I	3
See options for remaining option core courses		9-10
Total Credits		**27-28**

Additional Required Courses: 32 cr. (B, E, H), 33 cr. (M)

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
Law Elective		3
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, 3 cr. (B, E, H); 4 cr. (M) [2]		3-4
Total Credits		**32-33**

Select remaining courses from one of the following options:

Building Option: Remaining Core courses (9 cr.)

C E 360	Geotechnical Engineering	3
CON E 322	Construction Equipment and Heavy Construction Methods	3
CON E 340	Concrete and Steel Construction	3
Total Credits		**9**

Remaining option courses 16 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]		2
Total Credits		**16**

Heavy Option: Remaining Core courses (9 cr.)

C E 360	Geotechnical Engineering	3
CON E 322	Construction Equipment and Heavy Construction Methods	3
CON E 340	Concrete and Steel Construction	3
Total Credits		**9**

Remaining option 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		6
Engineering Topics Electives - A (Student must complete at least 3 credits from List A)		
CON E 381A	Bidding Construction Projects I: Heavy and Highway	
CON E 481A	Bidding Construction Projects II: Heavy and Highway	
C E 594E	Special Topics Construction Engineering and Mgt.: Project Controls	

C E 594F	Special Topics Construction Engineering and Mgt.: Computer Applications for Project Controls	
C E 505	Design of Construction Systems	
C E 594O	Special Topics Construction Engineering and Mgt.: Highway and Heavy Construction	
Engineering Topics Electives - B		
C E 501	Preconstruction Project Engineering and Management	
C E 502	Construction Project Engineering and Management	
C E 503	Construction Finance and Business Management	
C E 355	Principles of Transportation Engineering	
C E 372	Engineering Hydrology and Hydraulics	
C E 417	Land Surveying	
C E 460	Foundation Engineering	
Any other C E 500 level course		
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**

Remaining option courses - 13 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
Total Credits		**13**

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**

Remaining option courses - 13 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
Total Credits		**13**

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 Professional Engineering Curricula for accepted substitutions for curriculum designated courses in the Basic Program

See also: A 4-year plan of study grid showing course template by semester for a building emphasis in Construction Engineering.

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

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/2016-2017/collegeofengineering/constructionengineering/#fouryearplantext)

See also: A 4-year plan of study grid showing course template by semester for a mechanical emphasis in Construction Engineering.

Construction Engineering, B.S. building emphasis

First Year

Fall	Credits	Spring	Credits
ENGR 101	0	C E 170	2
C E 160	3	MATH 166	4
MATH 165	4	PHYS 221	5
CHEM 167	4	ENGL 250	3
ENGL 150	3	CON E 122	1
CON E 121	1		
LIB 160	1		
	16		**15**

Second Year

Fall	Credits	Spring	Credits
CON E 222	3	CON E 241	3
C E 111	3	CON E 251	1
STAT 105	3	MATH 266	3
PHYS 222	5	E M 274	3
		SSH Elective (PSYCH 101/230/280)	3
		MATH or STAT Elective	3
	14		**16**

Third Year

Fall	Credits	Spring	Credits
CON E 322	3	CON E 340	3
CON E 380 or ACCT 215	3	CON E 352	3
E M 378	3	CON E 353	3
E M 324	3	C E 360	3
E M 327	1	C E 332	3
I E 305	3	ECON 101 or 102	3
	16		**18**

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	ENGL 302/309/314	3
C E 333	3	C E 334	3
SSH Elective (Intl Perspective)	3	SSH Elective (US Diversity)	3

Engr Topics Elective	2	
	15	**15**

Total Credits: 125

Construction Engineering, B.S. electrical emphasis

First Year

Fall	Credits	Spring	Credits
ENGR 101	0	C E 170	2
C E 160	3	MATH 166	4
MATH 165	4	PHYS 221	5
CHEM 167	4	ENGL 250	3
ENGL 150	3	CON E 122	1
CON E 121	1		
LIB 160	1		
	16		**15**

Second Year

Fall	Credits	Spring	Credits
CON E 222	3	CON E 241	3
C E 111	3	CON E 251	1
PHYS 222	5	MATH 267	4
MATH or STAT Elective	3	E M 274	3
		SSH Elective (PSYCH 101/230/280)	3
		E E 201	4
	14		**18**

Third Year

Fall	Credits	Spring	Credits
STAT 105	3	CON E 352	3
E M 378	3	CON E 353	3
E M 324	3	CON E 380 or ACCT 215	3
E E 230	4	C E 332	3
		E E 303	3
		I E 305	3
	13		**18**

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
SSH Elective (Intl Perspective)	3	ENGL 302/309/314	3
ECON 101 or 102	3	SSH Elective (US Diversity)	3
	15		**15**

Total Credits: 124

Construction Engineering, B.S. heavy/highway emphasis

First Year

Fall	Credits	Spring	Credits
ENGR 101	0	C E 170	2
C E 160	3	MATH 166	4
MATH 165	4	PHYS 221	5
CHEM 167	4	ENGL 250	3
ENGL 150	3	CON E 122	1
CON E 121	1		
LIB 160	1		
	16		**15**

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 266	3
PHYS 222	5	E M 274	3
		PSYCH 101/230/280	3
		STAT 105	3
	14		**16**

Third Year

Fall	Credits	Spring	Credits
CON E 322	3	CON E 340	3
CON E 380 or ACCT 215	3	Engr Topics Electives	6
E M 378	3	C E 360	3
E M 324	3	C E 332	3
E M 327	1	ECON 101 or 102	3
I E 305	3		
	16		**18**

Fourth Year

Fall	Credits	Spring	Credits
CON E 422	3	CON E 487	3
CON E 441	3	CON E 488	3
C E 382	3	ENGL 302/309/314	3
C E 333	3	C E 334	3
SSH Elective (Intl Perspective)	3	SSH Elective (US Diversity)	3
	15		**15**

Total Credits: 125

Construction Engineering, B.S. mechanical emphasis

First Year

Fall	Credits	Spring	Credits
ENGR 101	0	C E 170	2
C E 160	3	MATH 166	4
MATH 165	4	PHYS 221	5
CHEM 167	4	ENGL 250	3
ENGL 150	3	CON E 122	1
CON E 121	1		
LIB 160	1		
	16		**15**

Second Year

Fall	Credits	Spring	Credits
CON E 222	3	CON E 241	3
C E 111	3	CON E 251	1
MATH 265	4	MATH 267	4
PHYS 222	5	E M 274	3
		PSYCH 101/230/280	3

		STAT 105	3
	15		**17**

Third Year

Fall	Credits	Spring	Credits
M E 231	3	CON E 380 or ACCT 215	3
CON E 352	3	E E 442	2
CON E 353	3	E M 378	3
E M 324	3	C E 332	3
I E 305	3	International Perspective	3
US Diversity	3	E E 448	2
	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	ENGL 302/309/314	3
M E 441	3	M E 442	3
ECON 101 or 102	3		
	16		**12**

Total Credits: 125

Construction Engineering, B.S. electrical emphasis

First Year

Fall	Credits	Spring	Credits
ENGR 101	0	C E 170	2
C E 160	3	MATH 166	4
MATH 165	4	PHYS 221	5
CHEM 167	4	ENGL 250	3
ENGL 150	3	CON E 122	1
CON E 121	1		
LIB 160	1		
	16		**15**

Second Year

Fall	Credits	Spring	Credits
CON E 222	3	CON E 241	3
C E 111	3	CON E 251	1
PHYS 222	5	MATH 267	4
MATH or STAT Elective	3	E M 274	3
		SSH Elective (PSYCH 101/230/280)	3
		E E 201	4
	14		**18**

Third Year

Fall	Credits	Spring	Credits
STAT 105	3	CON E 352	3
E M 378	3	CON E 353	3
E M 324	3	CON E 380 or ACCT 215	3
E E 230	4	C E 332	3
		E E 303	3
		I E 305	3
	13		**18**

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
SSH Elective (Intl Perspective)	3	ENGL 302/309/314	3
ECON 101 or 102	3	SSH Elective (US Diversity)	3
	15		**15**

Total Credits: 124

Construction Engineering, B.S. heavy/highway emphasis

First Year

Fall	Credits	Spring	Credits
ENGR 101	0	C E 170	2
C E 160	3	MATH 166	4
MATH 165	4	PHYS 221	5
CHEM 167	4	ENGL 250	3
ENGL 150	3	CON E 122	1
CON E 121	1		
LIB 160	1		
	16		**15**

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 266	3
PHYS 222	5	E M 274	3
		PSYCH 101/230/280	3
		STAT 105	3
	14		**16**

Third Year

Fall	Credits	Spring	Credits
CON E 322	3	CON E 340	3
CON E 380 or ACCT 215	3	Engr Topics Electives	6
E M 378	3	C E 360	3
E M 324	3	C E 332	3
E M 327	1	ECON 101 or 102	3
I E 305	3		
	16		**18**

Fourth Year

Fall	Credits	Spring	Credits
CON E 422	3	CON E 487	3
CON E 441	3	CON E 488	3
C E 382	3	ENGL 302/309/314	3
C E 333	3	C E 334	3
SSH Elective (Intl Perspective)	3	SSH Elective (US Diversity)	3
	15		**15**

Total Credits: 125

Construction Engineering, B.S. mechanical emphasis

First Year

Fall	Credits	Spring	Credits
ENGR 101	0	C E 170	2
C E 160	3	MATH 166	4
MATH 165	4	PHYS 221	5
CHEM 167	4	ENGL 250	3
ENGL 150	3	CON E 122	1
CON E 121	1		
LIB 160	1		
	16		**15**

Second Year

Fall	Credits	Spring	Credits
CON E 222	3	CON E 241	3
C E 111	3	CON E 251	1
MATH 265	4	MATH 267	4
PHYS 222	5	E M 274	3
		PSYCH 101/230/280	3
		STAT 105	3
	15		**17**

Third Year

Fall	Credits	Spring	Credits
M E 231	3	CON E 380 or ACCT 215	3
CON E 352	3	E E 442	2
CON E 353	3	E M 378	3
E M 324	3	C E 332	3
I E 305	3	International Perspective	3
US Diversity	3	E E 448	2
	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	ENGL 302/309/314	3
M E 441	3	M E 442	3
ECON 101 or 102	3		
	16		**12**

Total Credits: 125

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. See Civil Engineering, Courses and Programs.

A graduate certificate is also available which requires 12 credits:

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
One of the following:		3
C E 505	Design of Construction Systems	
C E 506	Case Histories in Construction Documents	
C E 510	Information Technologies for Construction	
C E 594A	Special Topics Construction Engineering and Mgt.: Planning and Scheduling	
C E 594C	Special Topics Construction Engineering and Mgt.: Cost Estimating	
C E 594E	Special Topics Construction Engineering and Mgt.: Project Controls	
C E 594F	Special Topics Construction Engineering and Mgt.: Computer Applications for Project Controls	
C E 594L	Special Topics Construction Engineering and Mgt.: Advanced Building Construction Topics	
C E 594M	Special Topics Construction Engineering and Mgt.: Design Build Construction	
Total Credits		**12**

Courses are offered for minor work to students taking major work in other curricula or in interdepartmental programs.

Courses primarily for undergraduates:

CON E 112: Orientation to Learning and Productive Team Membership
(Cross-listed with AER E, FS HN, HORT, NREM). (2-0) Cr. 2. F.
Introduction to developing intentional learners and worthy team members. Learning as the foundation of human enterprise; intellectual curiosity; ethics as a personal responsibility; everyday leadership; effective team and community interactions including team learning and the effects on individuals; and growth through understanding self, demonstrating ownership of own learning, and internalizing commitment to helping others. Intentional mental processing as a means of enhancing learning. Interconnectedness of the individual, the community, and the world.

CON E 114: Developing Responsible Learners and Effective Leaders
(Cross-listed with FS HN, HORT, NREM). (2-0) Cr. 2. S.
Prereq: Hort 112 or NREM 112
Focus on team and community. Application of fundamentals of human learning; evidence of development as a responsible learner; intentional mental processing as a habit of mind; planning and facilitating learning opportunities for others; responsibility of the individual to the community and the world; leading from within; holding self and others accountable for growth and development as learners and leaders.

CON E 121: Cornerstone Learning Community: Orientation to Academic Life
(0-2) Cr. 1. F.
Integration of first-year and transfer students into the engineering profession and the Construction Engineering program. Assignments and activities completed both individually and in learning teams involving teamwork, academic preparation, and study skills. Introduction to construction industry professionals. Teamwork topics include interdisciplinary teamwork, skills for academic success, diversity issues and leadership. Introduction to organization of program, department, college, and university. Overview of faculty, staff, policies, procedures and resources.

CON E 122: Cornerstone Learning Community: Orientation to Professional Life
(0-2) Cr. 1. S.
Continuation of Con E 121. Integration of first-year and transfer students into the engineering profession. Career preparation, professional ethics, construction research, leadership. Introduction to construction industry professionals including how they interact with engineers in other disciplines. Continued introduction to program, department, college, and university organization. Overview of faculty, staff, policies, procedures and resources.

CON E 222: Contractor Organization and Management of Construction
(2-2) Cr. 3. F.S.
Prereq: Completion of basic program
Entry level course for construction engineering: integration of significant engineering and management issues related to construction company operations. Company organization and operations; construction and project administration; construction contracts; delivery systems; construction safety; contract documents.

CON E 241: Construction Materials and Methods
(2-3) Cr. 3. F.S.
Prereq: CON E 222
Introduction to materials and methods of building construction and to construction drawings. Foundation, structural framing, floor, roof, and wall systems. Blueprint reading and quantity takeoff techniques.

CON E 251: Mechanical/Electrical Materials and Methods
(0-3) Cr. 1. F.S.
Prereq: Credit or enrollment in CON E 241
Introduction to the materials and methods for mechanical and electrical construction systems and drawings. HVAC, water and waste water, power distribution, lighting, and fire protection. Blueprint reading and quantity takeoff.

CON E 298: Cooperative Education
Cr. R. F.S.SS.
Prereq: Permission of department and Engineering Career Services
First professional work period in the cooperative education program. Students must register for this course before commencing work.

CON E 322: Construction Equipment and Heavy Construction Methods
(2-2) Cr. 3. F.S.
Prereq: CON E 241 or C E 306
Selection and acquisition of construction equipment. Application of engineering fundamentals and economics to performance characteristics and production of equipment. Heavy construction methods and economic applications.

CON E 340: Concrete and Steel Construction
(2-2) Cr. 3. F.S.
Prereq: E M 324, credit or enrollment in CON E 322
Planning and field engineering for concrete and steel construction. Design and applications of concrete formwork to construction. Erection of structural steel. Emerging industry themes.

CON E 352: Mechanical Systems in Buildings
(2-2) Cr. 3. F.S.
Prereq: CON E 251, PHYS 222
Comprehensive coverage of mechanical systems, plumbing, fire protection. Analysis techniques and design principles for each system. Required comprehensive design project for a major building project.

CON E 353: Electrical Systems in Buildings
(2-2) Cr. 3. F.S.
Prereq: PHYS 222 and credit or enrollment in CON E 352
Comprehensive coverage of building electrical systems including power, lighting, fire alarm, security and communications. Analysis techniques and design principles for each system. Required comprehensive design project for a major building project.

CON E 354: Building Energy Performance
(3-0) Cr. arr. F.
Prereq: Junior Classification
Energy performance of buildings, building shells, HVAC, electrical and other building systems. Analysis and evaluation of building performance, energy efficiency, environmental quality, first costs, and operating costs. Strategies to exceed energy code requirements through the ASHRAE Standard 90.1.

CON E 380: Engineering Law
(3-0) Cr. 3. F.S.
Prereq: Junior classification
Introduction to law and judicial procedure as they relate to the practicing engineer. Contracts, professional liability, professional ethics, licensing, bidding procedures, intellectual property, products liability, risk analysis. Emphasis on development of critical thinking process, abstract problem analysis and evaluation.

CON E 381: Bidding Construction Projects I
(0-3) Cr. 1. F.
Prereq: Permission from the instructor
Team development of construction process designs and cost estimates for transportation construction projects under closely simulated conditions. Examine project sites, consult with construction industry mentors, obtain subcontractor and supplier quotations, and submit bids. Offered in the following specialities:.

CON E 381A: Bidding Construction Projects I: Heavy and Highway
(0-3) Cr. 1. F.
Prereq: Permission from the instructor
Team development of construction process designs and cost estimates for transportation construction projects under closely simulated conditions. Examine project sites, consult with construction industry mentors, obtain subcontractor and supplier quotations, and submit bids. Offered in the following specialities:.

CON E 381B: Bidding Construction Projects I: Building
(0-3) Cr. 1. F.
Prereq: Permission from the instructor
Team development of construction process designs and cost estimates for transportation construction projects under closely simulated conditions. Examine project sites, consult with construction industry mentors, obtain subcontractor and supplier quotations, and submit bids. Offered in the following specialities:.

CON E 381C: Bidding Construction Projects I: Mechanical
(0-3) Cr. 1. F.
Prereq: Permission from the instructor
Team development of construction process designs and cost estimates for transportation construction projects under closely simulated conditions. Examine project sites, consult with construction industry mentors, obtain subcontractor and supplier quotations, and submit bids. Offered in the following specialities:.

CON E 381D: Bidding Construction Projects I: Electrical
(0-3) Cr. 1. F.
Prereq: Permission from the instructor
Team development of construction process designs and cost estimates for transportation construction projects under closely simulated conditions. Examine project sites, consult with construction industry mentors, obtain subcontractor and supplier quotations, and submit bids. Offered in the following specialities:.

CON E 381E: Bidding Construction Projects I: Mechanical and Electrical
(0-3) Cr. 1. F.
Prereq: Permission from the instructor
Team development of construction process designs and cost estimates for transportation construction projects under closely simulated conditions. Examine project sites, consult with construction industry mentors, obtain subcontractor and supplier quotations, and submit bids. Offered in the following specialities:.

CON E 381F: Bidding Construction Projects I: Miscellaneous
(0-3) Cr. 1. F.
Prereq: Permission from the instructor
Team development of construction process designs and cost estimates for transportation construction projects under closely simulated conditions. Examine project sites, consult with construction industry mentors, obtain subcontractor and supplier quotations, and submit bids. Offered in the following specialities:.

CON E 396: Summer Internship
Cr. R. Repeatable. SS.
Prereq: Permission of department and Engineering Career Services
Summer professional work period. Students must register for this course before commencing work.

CON E 397: Engineering Internship
Cr. R. Repeatable. F.S.
Prereq: Permission of department and Engineering Career Services
Professional work period, one semester maximum per academic year. Students must register for this course before commencing work.

CON E 398: Cooperative Education
Cr. R. F.S.SS.
Prereq: CON E 298, permission of department and Engineering Career Services
Second professional work period in the cooperative education program. Students must register for this course before commencing work.

CON E 422: Construction Cost Estimating and Cost Engineering
(2-2) Cr. 3. F.S.
Prereq: CON E 241 and 251
Conceptual and detailed cost estimating. Theory and practice of estimating construction costs of materials, labor, equipment, contingency, overhead and markup. Estimating competencies and bid ethics. Electronic quantity take off and pricing methods. Assemblies costs, unit costs, production rates. Analysis of project profitability, cost analysis and cost control methods. Value engineering. Life cycle cost analysis.

CON E 441: Construction Planning, Scheduling, and Control
(2-2) Cr. 3. F.S.
Prereq: Credit or enrollment in CON E 421
Integration of previous construction coursework into the planning, scheduling, and management of time, costs, and other resources. Emphasis on preparation and analysis of network schedules. Comprehensive planning and scheduling project. Computer project management applications.

CON E 481: Bidding Construction Projects II
(0-3) Cr. 1. F.
Prereq: Permission from the instructor
Similar to Con E 381, except students with previous experience attempt projects with larger scope or lead students with less experience.

CON E 481A: Bidding Construction Projects II: Heavy and Highway
(0-3) Cr. 1. F.
Prereq: Permission from the instructor
Similar to Con E 381, except students with previous experience attempt projects with larger scope or lead students with less experience.

CON E 481B: Bidding Construction Projects II: Building
(0-3) Cr. 1. F.
Prereq: Permission from the instructor
Similar to Con E 381, except students with previous experience attempt projects with larger scope or lead students with less experience.

CON E 481C: Bidding Construction Projects II: Mechanical
(0-3) Cr. 1. F.
Prereq: Permission from the instructor
Similar to Con E 381, except students with previous experience attempt projects with larger scope or lead students with less experience.

CON E 481D: Bidding Construction Projects II: Electrical
(0-3) Cr. 1. F.
Prereq: Permission from the instructor
Similar to Con E 381, except students with previous experience attempt projects with larger scope or lead students with less experience.

CON E 481E: Bidding Construction Projects II: Mechanical and Electrical
(0-3) Cr. 1. F.
Prereq: Permission from the instructor
Similar to Con E 381, except students with previous experience attempt projects with larger scope or lead students with less experience.

CON E 481F: Bidding Construction Projects II: Miscellaneous
(0-3) Cr. 1. F.
Prereq: Permission from the instructor
Similar to Con E 381, except students with previous experience attempt projects with larger scope or lead students with less experience.

CON E 487: Construction Engineering Design I
(2-2) Cr. 3. F.S.
Prereq: CON E 380 or ACCT 215, CON E 340 (B, H), CON E 352 (B, E, M), CON E 353 (B, E, M), CON E 421, CON E 441. Student must be within two semesters of graduation
The integrated delivery of project services as a team, including preliminary engineering design process, constructability review, interaction with the client, identification of engineering problems, developments of a proposal, identification of design criteria, cost estimating, planning and scheduling, application of codes and standards, development of feasible alternatives, selection of best alternative, and delivery of oral presentations.

CON E 488: Construction Engineering Design II
(1-5) Cr. 3. F.S.
Prereq: CON E 380 or ACCT 215. Coreq: CON E 487
Application of team design concepts to a construction engineering project. Project planning. Advanced construction and project management.

CON E 490: Independent Study
Cr. 1-5. Repeatable. F.S.SS.
Prereq: Permission of instructor
Individual study in any phase of construction engineering. Pre-enrollment contract required.

CON E 498: Cooperative Education
Cr. R. Repeatable. F.S.SS.
Prereq: CON E 398, permission of department and Engineering Career Services
Third and subsequent professional work periods in the cooperative education program. Students must register for this course before commencing work.