

Construction Engineering Thrust Area (2020-21)

Civil Engineering ATE (Approved Technical Elective) Advising Sheet

Each CE student is required to take 24 units of ATE (Approved Technical Electives). These electives can be any CE/ENVE 400/500 level coursework (not required as part of the major), some CE/ENVE 300 level course work, or any one of a list of preapproved elective options from outside CE/ENVE (check the department website). This freedom in the CE program allows students to specialize in a particular area (or two or three...) or develop a little deeper in all areas. Please consider your choices in the context of graduate school, the area in which you would like to practice, or the breadth of knowledge you would like to attain. Below is the **Thrust Area** for Construction Engineering (ConE) to consider as you plan your Senior Year. **NOTE:** You may mix and match ATE's in any way you like that works best for you, your schedule, and **we encourage you to seek faculty advising** to help map out your final choices.

Students interested in Construction Engineering are strongly encouraged to meet specifically with Prof Alzraiee for guidance. As there is a substantial incorporation of non-CE major courses, permissions will be needed to exceed the outside 4-unit major limiting requirement. Further, coordination with the CM department will be necessary to ensure that CE students will be able to take the CM courses as we do not have priority in those classes. ***Courses in the ConE thrust assume student has completed CE/CM 371.***

	Fall	Winter	Spring
CE Construction/Permitting Courses	CE 475 (4) - Civil Infrastructure and Building Systems (offered Fall and Winter)		
	CE 415 (2) - Advanced BIM for Civil Engineering	CE 474 (2) - Environmental Compliance and Permitting	
Strongly Suggested CM Complementary Courses	CM 310 ¹ (4) - Construction Means and Methods	ENGR/ BUS 310 ² (4) - Introduction to Entrepreneurship. (suggested Winter or Spring)	
		CM 314 ³ (5) - Heavy Civil Construction Management (suggested Winter or Spring)	
	CM 317 (4) - Sustainability and the Built Environment (recommended Fall or Winter)		CM 475 (4) - Real Property Development Principles
Recommended Geotechnical and Structural Complementary Courses	CE 488 (4) - Engineering Risk Analysis		
	CE 481 (4) - Analysis and Design of Shallow Foundations (offered Fall, Winter, and Spring)		
	CE 356 (4) - Structural Steel Design (Course offered Fall and Spring - NOT Winter)		

1. Offered Fall and Spring but recommended for the Fall
2. Prerequisite: Completion of GE Area A with grades of C- or better. Crosslisted as BUS/ENGR 310.
3. Course is a 3 unit lab and 2 unit activity. Course will have 16 contact hours per week. Plan accordingly.

CE 415. Advanced Building Information Modeling for Civil Engineer. 2 units - Prerequisite: CE/CM 371 and CE 355. Recommended CM 280.

Use Building Information Modeling approach to design, optimize, construct, and manage vertical structures. BIM based quantity take-off, clash detection, 4D modeling, and reality capturing using 3D laser scanner.

CE 475. Civil Infrastructure and Building Systems. 4 units - Prerequisite: Senior standing in CE or ARCE.

Principles and practices for the sustainable design, fabrication, and installation of systems for the civil infrastructure and building; including structural, air/gas, water/wastewater, electrical, and control systems. Methods and materials used for fabrication and installation; including cost and schedule considerations. 4 lectures. Crosslisted as ARCE/CE 475.

CE 474. Environmental Compliance and Permitting. 2 units - Prerequisite: Senior standing.

Fundamentals of State and Federal environmental laws essential to getting Civil Engineering projects permitted. 2 lectures.

CM 310. Construction Means and Methods. 4 units - Prerequisite: CM 113.

Construction means, methods, and techniques related to the built environment including residential, commercial, heavy civil and HVACR construction. Focus on the major construction material assemblies and systems with an emphasis on constructability, best practices, and application. Field trips required. 4 lectures.

CM 317. Sustainability and the Built Environment. 4 units - Prerequisite: Junior standing and completion of GE Area B.

Interdisciplinary analysis of sustainable strategies and technologies to enhance the built environment. A systems approach to green building science that includes sustainable site development, water use efficiency, renewable energy, improving material use, indoor environmental quality, and design innovation. Course may be offered in classroom-based or online format. 4 lectures. Fulfills GE Area F.

CM 475. Real Property Development Principles. 4 units - Prerequisite: Minimum junior standing.

Development process and its major actors: investors, developers, government agencies, environmental and local stakeholders; their development roles, objectives, approaches. Basics of urban markets and economics, financing, regulation, public planning; value added, contractual, environmental and community context factors. 4 lectures.

CM 314. Heavy Civil Construction Management. 5 units - Prerequisite: CM 313. Corequisite: CM 334.

Materials, methods, and techniques associated with civil engineering projects and heavy construction operations. Topics include tunnel, bridge, dam, and road construction; equipment selection; and temporary structures. Scheduling, estimating, and construction contracts are integrated into a project based approach. 3 laboratories, 2 activities.

CE 481. Analysis and Design of Shallow Foundations. 4 units - Prerequisite: CE 381 and CE 382.

Evaluation of shear strength for foundation design. Analysis of bearing capacity for generalized conditions. Design of reinforced concrete spread footings. Stress distributions beneath loaded areas. Immediate settlement, consolidation settlement, rate of consolidation, and creep. 4 lectures.

CE 488. Engineering Risk Analysis. 4 units - Prerequisite: STAT 312.

Introduction to the basic concepts of probability theory, statistics, and decision theory as they pertain to problems in civil and environmental engineering. Emphasis placed on the use of probabilistic modeling, Bayesian statistics, risk analysis, and decision theory. 4 lectures.

CE 356. Structural Steel Design. 4 units - Term Typically Offered: F, SP

Design and behavior of the elements of steel structures. Design and analysis of bolted, welded and eccentric connections. Proportioning of members and connections. Introduction to plastic design, end plate connection, composite construction, shear connections and design of composite beams. 3 lectures, 1 laboratory.

ENGR 310. Introduction to Entrepreneurship. 4 units - Prerequisite: Completion of GE Area A with grades of C- or better.

Role and impact of entrepreneurship and technology startups; characteristics and traits of entrepreneurs; opportunity identification and assessment; frameworks for building startups; the founding team; organizational and legal issues; business and value proposition models; acquiring resources; entrepreneurial risk; realizing and harvesting value. 4 lectures. Crosslisted as BUS/ENGR 310.