Construction Engineering Thrust Area (2021-2022)

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 coursework, 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 area generally require CE/CM 371 and CM 310.**

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<th>Fall</th>
<th>Winter</th>
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<td>CE Construction/Permitting Courses</td>
<td>CE 475 (4) - Civil Infrastructure and Building Systems (offered Fall and Winter)</td>
<td>CE 474 (2) - Environmental Compliance and Permitting</td>
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<td>CE 415 (4) - Advanced BIM for Civil Engineering</td>
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<td>Strongly Suggested CM Complementary Courses</td>
<td>CM 310(^1) (4) - Construction Means and Methods</td>
<td>CM 475 (4) - Real Property Development Principles</td>
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<td>CM 314(^2) (5) - Heavy Civil Construction Management</td>
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<td>CM 317 (4) - Sustainability and the Built Environment</td>
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<td>Recommended Geotechnical and Structural Complementary Courses</td>
<td>CE 488 (4) - Engineering Risk Analysis</td>
<td>CE 457 (4). Bridge Engineering.</td>
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<td>CE 481 (4) - Analysis and Design of Shallow Foundations</td>
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<td>CE 356 (4) - Structural Steel Design (Course offered Fall and Spring - NOT Winter)</td>
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* Students are strongly advised to verify when the courses will be offered.
1. Course is a 3 unit lab and 2 unit activity. Course will have 16 contact hours per week. Plan accordingly.
CM 310. Construction Means and Methods. 4 units
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 314. Heavy Civil Construction Management. 5 units
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.

CM 317. Sustainability and the Built Environment. 4 units
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.

CE 356. Structural Steel Design. 4 units
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.

CE 415. Advanced Building Information Modeling for Civil Engineer. 4 units
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 457. Bridge Engineering. 4 units

CE 474. Environmental Compliance and Permitting. 2 units
Fundamentals of State and Federal environmental laws essential to getting Civil Engineering projects permitted. 2 lectures

CE 475. Civil Infrastructure and Building Systems. 4 units
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 481. Analysis and Design of Shallow Foundations. 4 units

CE 488. Engineering Risk Analysis. 4 units
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.