

# General Civil 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 General Civil Engineering (GenCiv) 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 your final choices.

Students interested in GenCiv area may wish to consider the following track. The courses listed in the common ATE block were the highest recommended by a local survey of GenCiv engineering firms. Complementary courses in the Water/Transportation, Construction, Geotechnical, and Structural areas have also been included. The GenCiv area provides a strong breadth in Civil Engineering and this breadth will well prepare the student for either graduate school in any of the sub disciplines or for work in the area of site design/general civil. Generally, **courses in the GenCiv Thrust Area require prior completion of CE336, CE337, CE381, CE382, CE321, CE322, CE352, and CE355.** However, it is advised to check specific prerequisites when planning your senior schedules.

	Fall	Winter	Spring
<b>Choose <u>all</u> from this group:</b>			
Recomended General Courses	CE 413 (2) - Advanced Civil Computer-Aided Site Design (offered Fall and Winter)		
	CE 475 (4) - Civil Infrastructure and Building Systems (offered Fall and Winter)		
		CE 474 (2) - Environmental Compliance and Permitting	
<b>Recomended <u>at least</u> three of the following:</b>			
Water and Transportation Complements	CE 440 (4) - Hydraulic Systems Engineering (offered Fall and Winter)		
		CE 422 (4) - Highway Geometrics and Design	
Construction Complement	CE/CM 371 (4) -Construction Management and Project Planning (offered Fall, Winter, and Spring)		
Additional Water/ Transportation	CE 421 (4) - Traffic Engineering		
	CE 433 (4) - Open Channel Hydraulics		
Additional Geotechnical	CE 481 (4) -Analysis and Design of Shallow Foundations (offered Fall, Winter, and Spring)		
Additional Structural Options	CE 356 (4) - Structural Steel Design (Couse offered Fall and Spring - NOT Winter)		
			CE 457 (4) - Bridge Engineering

**CE 413. Advanced Civil Computer-Aided Site Design. 2 units - Prerequisite: BRAE 239 and CE 113.**

Apply advanced CAD software to develop design techniques and convey the completed design on a set of plans; site coordination, basic road design, grading, and utility design. 2 laboratories.

**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.

**CE 440. Hydraulic Systems Engineering. 4 units - Prerequisite: CE 336.**

Water and wastewater flows. Design of water distribution systems, transmission and storage reservoirs, wastewater collection systems, and storm water systems. Pumps and pump systems, flow measurements. Water sources for municipal supply. 3 lectures, 1 laboratory.

**CE 422. Highway Geometrics and Design. 4 units - Prerequisite: CE 321.**

Alignment location and safe geometric design of highways. Earthwork and drainage related to highway. Theory and practice in design of alignments, highway cross-sections, intersections, interchanges, and freeways in urban and rural areas. Application of advanced computer software to highway geometrics. 2 lectures, 2 laboratories.

**CE 371. Construction Management and Project Planning. 4 units - Prerequisite: ARCE 106, CE 259 or CM 113.**

Theory and practice of planning, scheduling, estimating, and reporting for construction projects. Fundamentals of scheduling logic including critical path, deterministic, and probabilistic scheduling; including the impact of constraints. Identifying resources and estimating time requirements for design activities and project operations. Not open to Architectural Engineering or Construction Management majors. 3 lectures, 1 activity. Crosslisted as CE/CM 371.

**CE 421. Traffic Engineering. 4 units - Prerequisite: CE 321.**

Principles of traffic circulation on highway systems and other modes. Traffic control. Traffic data collection and analysis. Capacity analysis. Traffic modeling. New technologies. 3 lectures, 1 laboratory.

**CE 433. Open Channel Hydraulics. 4 units - Prerequisite: CE 336.**

Analysis and characteristics of flow in open channels; critical flows; uniform flow; gradually varied flow; channel design problems, channel transitions and controls. Rapidly varied flow; hydraulic jump and energy dissipaters. Unsteady flows, waves and wave propagation, flood routing. Applications of numerical methods in hydraulic engineering. 4 lectures.

**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 356. Structural Steel Design. 4 units - Prerequisite: CE 352.**

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 457. Bridge Engineering. 4 units - Prerequisite: CE 355.**

Fundamentals of the structural analysis and design of highway bridges. Construction materials in bridges. Loads on highway bridges. Load path and distribution in bridge superstructure. Design of reinforced concrete, pre-stressed concrete, and composite bridges. 3 lectures, 1 laboratory.

**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.