

Transportation Engineering Thrust Area (2018-19)

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 Transportation Engineering 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 transportation engineering may wish to consider one of following two tracks: **Transportation Design** or **Analysis/planning/operations**. Graduate level CE 5XX courses in transportation engineering offer the opportunity to gain depth in either of the particular transportation tracks as listed. However, we recommend a student consider **no more** than two graduate level courses when putting together his/her study plan. Outside-the-major (Outside Civil Engineering) recommended courses listed in the table below complement TE focused civil engineering undergraduates (for either students going directly to practice or students continuing on to graduate school). **Courses in the TE Thrust Area require prior completion of CE321 and CE322.**

		Fall	Winter	Spring
Analysis/ Planning/ Operations Track	400-level Transportation Courses (most relevant)	CE 421 (4) - Traffic Engineering	CE 424 (4) - Public Transportation	CE 423 (4) - Intelligent Transportation Systems
	Recommended 500-level Transportation Courses (maximum of two)	CE 523 (4) - Systems Planning	CE 526 (4) – Transportation Safety	CE 529 (4) - Modeling and Simulation in Transportation
	Outside Transportation Engineering Recommendations (maximum of two) ¹	CRP 435 (4) – Transportation Theory	STAT 426 ² (4) – Estimation and Sampling Theory	EE 424 (4) – Introduction to Remote Sensing
Transportation Design Track	400-level Transportation Courses (most relevant)	CE 421 (4) - Traffic Engineering	CE 422 (4) - Highway Geometrics and Design	CE 425 (4) – Introduction to Railway Engineering
	Recommended 500-level Transportation Courses		CE 525 (4) – Airport Planning and Design	CE 527 (4) – Sustainable Mobility
	Outside Transportation Engineering Recommendations (maximum of two) ¹	STAT 324 ² (4) – Applied Regression Analysis (offered Fall, Winter, and Spring)		
		STAT 330 ² (4) – Statistical Computing with SAS (offered Fall and Winter)		CE/CM 371 (4) – Construction Management and Project Planning
	CRP 435 (4) – Transportation Theory			

1. Contact Engineering Advising Center. Approval required for more than 4 units of ATE outside the major.

2. Contact Stats department for prerequisite waivers and permission numbers.

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 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 423. Intelligent Transportation Systems. 4 units - Prerequisite: CE 321 or graduate standing.

Specification and operation of Intelligent Transportation Systems (ITS). Traffic surveillance and control systems including applications to freeways, urban streets, rural highways, and public transportation. Standards include the National Architecture for ITS. 3 lectures, 1 laboratory.

CE 424. Public Transportation. 4 units - Prerequisite: CE 321.

Interdisciplinary aspects of public transportation problems, systems-team design approach to solutions. History and present state of public transportation; role of public transportation in urban environment; legislative, political, social, and economic aspects of public transportation systems. Methodology and procedures for transit planning. Review of transit studies. 3 lectures, 1 laboratory.

CE 425. Introduction to Railway Engineering. 4 units - Prerequisite: CE 321, and CE 381.

Introduction to railroad and railway system analysis and design. Railroads, rail transit and high speed rail applications. Track foundation design for various conditions. Approaches to railway analysis and design and an introduction to railway traffic control and signaling. 4 lectures.

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 523. Transportation Systems Planning. 4 units - Prerequisite: CE 321 or graduate standing.

Planning of urban and regional multimodal transportation systems. Modeling of transportation networks and travel demand. Travel survey design. Urban data systems. Evaluation of alternatives based on economic, social, technological, and other factors. 2 lectures, 2 laboratories.

CE 525. Airport Planning and Design. 4 units - Prerequisite: CE 321 or graduate standing.

Historical background of aviation and airport development; financing; estimating demand; aircraft characteristics; airport capacity; airspace and air traffic control; site selection; airport configuration; geometric design of landing area; planning and development of terminal areas; lighting; pavement design and drainage. 3 lectures, 1 laboratory.

CE 526. Transportation Safety. 4 units - Prerequisite: CE 321, CE 322, STAT 312.

Introduction to nature and extent of transportation safety problem worldwide and in the United States. Several sub-areas of transportation safety: road safety, human factors, vehicle safety; crash data collection and management; safety planning; hot spot identification; methodologies for conducting transportation accident studies; statistical applications to accident data; predictive model building; 'before-after' studies; countermeasure design. 3 lectures, 1 laboratory.

CE 527. Sustainable Mobility. 4 units - Prerequisite: CE 321 or CRP 435 or consent of instructor.

Presentation and analysis of concepts and designs for sustainable mobility from a global-to-local, interdisciplinary perspective, including pedestrians, bicyclists, and public transportation. Addresses economy, environment, and equity (social issues) through lectures, panels, excursions and a planning/design project in San Luis Obispo County. 3 lectures, 1 laboratory.

CE 529. Modeling and Simulation in Transportation. 4 units - Prerequisite: CE 321 or graduate standing.

Theory and operation of transportation systems, the systems approach, simulation techniques. Use of available software packages. Simulation model development, calibration and use. 2 lectures, 2 laboratories.

** See online course descriptions for CRP 435, EE 424, STAT 330, STAT 324, or STAT 313. Detailed courses descriptions omitted for brevity.