Transportation Engineering Thrust Area (2022-23)

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 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 CE 222, CE321, and CE322.

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<th>Fall</th>
<th>Winter</th>
<th>Spring</th>
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<tbody>
<tr>
<td>Analysis/Planning/Operations Track</td>
<td>400-level Transportation Courses (most relevant)</td>
<td>CE 421 (4) - Traffic Engineering</td>
<td>CE 424 (4) - Public Transportation</td>
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<td>Recommended 500-level Transportation Courses (maximum of two)</td>
<td>CE 423 (4) - Intelligent Transportation Systems</td>
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<td>CE 523 (4) Transportation Systems Planning</td>
<td>CE 526 (4) - Transportation Safety</td>
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<td>Outside Transportation Engineering Recommendations (maximum of two)¹</td>
<td>CRP 435 (4) - Transportation Theory</td>
<td>CRP 420 (4) - Land Use Law</td>
<td>BRAE 447 (4) - Advance Surveying with GIS Applications</td>
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<tr>
<td>Transportation Design Track</td>
<td>400/500-level Transportation Courses (most relevant)</td>
<td>CE 421 (4) - Traffic Engineering</td>
<td>CE 422 (4) - Highway Geometrics and Design</td>
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<td>CE 429 (4) - Highway Pavement Design</td>
<td>CE 425 (4) - Intro. To Railway Engineering</td>
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<td>CE 525 (4) - Airport Planning and Design</td>
<td>CE 429 (4)¹ - Highway Pavement Design</td>
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¹ Contact Engineering Advising Center. Approval is required for more than 4 units of ATE outside the major.
2 Contact the Stats department for prerequisite waivers and permission numbers.
3 Depending on enrollment for spring quarter.
**CE 421. Traffic Engineering. 4 units - Prerequisite: CE 321.**

**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.**
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 429. Highway Pavement Designs. 4 units - Prerequisite: CE 259/CM 113; CE 381/ARCE 421; and CE 321.**
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.

**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 -- 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 420, CRP 435, and BRAE 447. Detailed course descriptions are omitted for brevity.