Transportation Engineering Thrust Area (2017-18)

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 our 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.

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<tr>
<th>Analysis/Planning/Operations Track</th>
<th>Fall</th>
<th>Winter</th>
<th>Spring</th>
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<tbody>
<tr>
<td>400-level Transportation Courses (most relevant)</td>
<td>CE 421 (4) - Traffic Engineering</td>
<td>CE 424 (4) - Public Transportation</td>
<td>CE 423 (4) - Intelligent Transportation Systems</td>
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<tr>
<td>Recommended 500-level Transportation Courses (maximum of two)</td>
<td>CE 528 (4) - Transportation Economics and Analysis</td>
<td>CE 526 (4) – Transportation Safety</td>
<td>CE 527 (4) - Sustainable Mobility</td>
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<td>Outside Transportation Engineering Recommendations (maximum of two)¹</td>
<td>CRP 435 (4) – Transportation Theory</td>
<td>STAT 426² (4) – Estimation and Sampling Theory</td>
<td>EE 424 (4) – Introduction to Remote Sensing</td>
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<tr>
<th>Transportation Design Track</th>
<th>Fall</th>
<th>Winter</th>
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<tbody>
<tr>
<td>400-level Transportation Courses (most relevant)</td>
<td>CE 421 (4) - Traffic Engineering</td>
<td>CE 422 (4) - Highway Geometries and Design</td>
<td>CE 425 (4) – Introduction to Railway Engineering</td>
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<tr>
<td>Recommended 500-level Transportation Courses (maximum of two)</td>
<td>CE 521 (4) - Highway Pavement Design</td>
<td>CE 525 (4) – Airport Planning and Design</td>
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<td>Outside Transportation Engineering Recommendations (maximum of two)¹</td>
<td>STAT 324² (4) – Applied Regression Analysis (offered Fall, Winter, and Spring)</td>
<td>STAT 330² (4) – Statistical Computing with SAS (offered Fall and Winter)</td>
<td>CE/CM 371 (4) – Construction Management and Project Planning</td>
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<td>CRP 435 (4) – Transportation Theory</td>
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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.

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 521. Highway Pavement Designs. 4 units - Prerequisite: CE 321, CE 259, CE 381 or graduate standing.
Theories, principles, and procedures in the structural design of highway pavements. Design of flexible and rigid pavements. Performance of flexible and rigid pavements in the field and the characterization of pavement materials. Practical and direct exposure to laboratory testing of pavement materials. 3 lectures, 1 laboratory.

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 528. Transportation Economics and Analysis. 4 units - Prerequisite: CE 321 or graduate standing.
Principles of engineering systems analysis and applications to transportation using examples from different modes. Identification of transportation benefits, costs, user and non-user impacts, transportation cost models, pricing, and optimization. 3 lectures, 1 laboratory.

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