Transportation 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 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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<thead>
<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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<td>Recommended 500-level Transportation Courses (maximum of two)</td>
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<td>CE 526 (4) – Transportation Safety</td>
<td>CE 529 (4) – Modeling and Simulation in Transportation</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>400/500-level Transportation Courses (most relevant)</td>
<td>CE 421 (4) - Traffic Engineering</td>
<td>CE 422 (4) - Highway Geometrics and Design</td>
<td>CE 527 (4) - Sustainable Mobility</td>
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<td>CE 429 (4) - Highway Pavement Design</td>
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<tr>
<td>Outside Transportation Engineering Recommendations (maximum of two)¹</td>
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<td>STAT 324² (4) – Applied Regression Analysis (offered Fall, Winter, and Spring)</td>
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<td>STAT 330² (4) – Statistical Computing with SAS (offered Fall and Winter)</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.
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 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
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 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.