Most college-level traffic engineering courses are offered through Civil Engineering departments. These courses often cover topics on flow theories, computations, and computer modeling pertaining to vehicular traffic. Students also learn to interpret and design roadway channelization, traffic control devices, and signal system operations. Through these courses, students gain fundamental understanding in traffic operations and regulations for providing safe and efficient transportation services.

Traffic engineers and transportation planners continue to play an important role in developing and delivering reliable transportation services to all road users. In practice, traffic engineers and transportation planners in all levels of governments (and consultants) handle situations far beyond signal timing or striping. Requests and complaints from public, media, and elected officials on a wide range of transportation related issues often consume the most amount time within a transportation agency. These issues could be charged with emotions due to traffic collisions, fatalities, parking citations, or perceived bad traffic. Most transportation professionals quickly realize that communication skills are as important as having technical knowledge in planning, design, or operations.

With 20 years of hands-on experience in managing and developing transportation programs, Professor Shen’s CE585 Traffic Engineering and Control (“Traffic System Management”) course uses problem-based learning approach to addressing a variety of transportation issues in urban regions. Lectures will be highly interactive and focused on “real-world” issues – often solved with a combination of technical solutions and common sense. Actual reports and case studies will form the basis for review and plan of actions. Verbal communications and report writing will be emphasized throughout the course.
Students are encouraged to pay attention to transportation related news by subscribing to the LA Metro daily email digest ([http://www simplesend.com/clientimages/metro/Optin.html](http://www.simplesend.com/clientimages/metro/Optin.html)). Throughout the entire semester, students will be advised to attend public hearings/meetings on transportation plans, programs, or projects in a community or city.

*Recommended preparation: CE 471: Principles of Transportation Engineering or equivalent (optional but not required)*

**I. TOPICS TO BE COVERED**

The **“Traffic Engineering: System Operations and Control”** will encompass the following topics:

- Overview of transportation planning, policies, operations and management
- Interrelations between land use, environmental regulations, and transportation
- Theories, techniques, and practice of data collection, analyses, and design
- Theories of traffic flow, queuing, and real-world applications
- Standards
- Channelization design & operations
- Applications of traffic control devices
- Intersection capacity analyses
- Practice and review of traffic impacts on development projects
- Traffic signal system – design & operations
- Integrated traffic management – theories & operations
- Intelligent Transportation Systems (ITS) – Concept, system design, and practice
- Concept of Inter-Modal Transportation System
- Goods movement and its traffic impacts
- Environmental impacts

The course will have 2.5 hours of lecture and up to two hours of pertinent computer lab work per week. The following software packages maybe used in this course:

- **2010 Highway Capacity Software** ([http://mctrans.ce.ufl.edu/hcs/hcsplus/](http://mctrans.ce.ufl.edu/hcs/hcsplus/)), 10 copies of HCS10 (version 6.6) is installed on desktop computers in KAP 239.
- **Synchro** ([http://www.trafficware.com/synchro.htm](http://www.trafficware.com/synchro.htm))
- **GIS** (not available in CE585 class, but students are encouraged to use GIS packages if available elsewhere).

Field survey, signal timing design and/or implementation will likely be conducted in conjunction with the Los Angeles City Department of Transportation near Downtown Los Angeles or USC campus. Some field work and data collection outside of the lecture hours may be required to complete independent design project (see Section IV). Appropriate dress for field work and safety awareness will be reviewed throughout the course.
II. **TEXT BOOK**


III. **STUDENT EVALUATION/HOMWORK ASSIGNMENTS**

Most homework assignments are based on real requests occurring in the City of Los Angeles. Every submission must be written in a professional manner and supported with appropriate amount of technical information. While most assignments will be graded as pass/fail, students should take each submission seriously and aim for excellence. Your final grade may be affected if you exhibited a lack of trying.

<table>
<thead>
<tr>
<th>Assignments</th>
<th>40%</th>
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<tbody>
<tr>
<td>Midterm/Final exam(s)</td>
<td>20%</td>
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<tr>
<td>Independent Research/Design Project</td>
<td>40%</td>
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<tr>
<td><strong>TOTAL</strong></td>
<td>100%</td>
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IV. **COURSE OUTLINE**
<table>
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<tr>
<th>WEEKS</th>
<th>LECTURE</th>
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| 1 & 2 | 8/27/14 9/3/14 | Basic concepts and physical components of transportation systems.  
Inter-relations and inter-dependence between land use, policies, funding, and transportation. |
| 3 & 4 | 9/10/14 9/17/14 | Traffic Stream Characteristics  
Basic Statistical Concepts  
Traffic Volume Studies  
Speed Travel Time & Delay Studies |
| 5 & 6 | Tentative: Field Lectures (TMCs) on Friday 9/19/2014  
[NO CLASS ON 9/10/2014 DUE TO WORK-RELATED TRAVEL]  
10/1/14 | Official traffic control devices; STOP warrants; MUTCD  
Traffic Volume Studies  
Speed Travel Time & Delay Studies  
Highway Capacity Analysis (HCS)  
Basic Freeway Sections  
Traffic Signal Design |
| 7 & 8 | 10/8/14 10/15/14 | Traffic Signal Systems – Controller,  
Detection and Communication; Analysis of Signalized Intersections |

**ASSIGMENTS**

**Notes:**

1. Submit all homework via email in PDF format unless otherwise instructed.  
2. All submissions are due by 5pm of the date specified.

|  | Reading Assignment: To be distributed by 8/20/2014 via email. In-class discussion.  
Homework #1: Pedestrian/Sidewalk Observation & Report. DUE 8/27/2014 (Pass/Fail only, no grade).  
Homework #2: Review, investigate, and prepare a mock response letter on traffic related issue(s). DUE 9/9/2014 (Pass/Fail only, no grade)  
Homework #3: Attend one public hearing/meeting on transportation topics. Submit a summary report on a particular issue and discuss the comments/decisions made on that item. DUE 9/23/2014 (Pass/Fail only, no grade)  
Homework #4: Review and prepare a technical memo on two proposed legislation (to be assigned). DUE 9/30/2014 (Letter grade)  
Homework 5: Textbook questions: to be assigned on 9/24/2013. DUE 10/1/2014 in class. Hand calculations, show work on ENGINEERING PAPERS; no Excel or Word printouts. Numeric grade  
Homework #6: STOP Warrants Investigation. DUE 10/8/2014 in class. Numeric grade  
Homework #7: Conduct capacity analyses by HCS (Freeway; Non-signalized Intersection). (Pass/Fail only, no grade). DUE 10/22/2014 in class. |
<table>
<thead>
<tr>
<th>Dates</th>
<th>Topics</th>
<th>Assignments</th>
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<tbody>
<tr>
<td>9 &amp; 10</td>
<td><strong>Signal Coordination &amp; Timing Charts</strong></td>
<td>Optimize traffic progression by Synchro 7.0; Develop signal timing parameters</td>
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<tr>
<td>10/22/14</td>
<td><strong>Mid-term Exam</strong></td>
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<td>10/29/14</td>
<td><strong>11/6/2014: Guest lecture (tentative)</strong></td>
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<td><strong>Traffic Synchronization &amp; Preemption</strong></td>
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<td><strong>Practice and review of traffic impacts by development projects</strong></td>
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<td><strong>Intelligent Transportation Systems – System Design &amp; Integration</strong></td>
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<td>11 &amp; 12</td>
<td><strong>Implement signal timing parameters in field;</strong></td>
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<td>11/5/14</td>
<td><strong>Fine-tuning parameters in field</strong></td>
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<td>11/12/14</td>
<td><strong>Measure of Effectiveness (MOE) – progression evaluation in field</strong></td>
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<tr>
<td>11/6/2014</td>
<td><strong>Traffic Synchronization &amp; Preemption</strong></td>
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<td><strong>Practice and review of traffic impacts by development projects</strong></td>
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<tr>
<td>11/19/14</td>
<td><strong>Intelligent Transportation Planning and Traffic Management</strong></td>
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<td>11/26/14</td>
<td><strong>Environmental Considerations</strong></td>
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<td><strong>No class on 11/26/2016</strong></td>
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<tr>
<td>12/3/14</td>
<td><strong>Comprehensive Design Project Presentations</strong></td>
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<tr>
<td>12/10/14</td>
<td><strong>Final Exam</strong></td>
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V. Research/Design Project

The composition of project team will be arranged based on the final enrollment of the 2014 fall class. Each team of three members will conduct an in-depth research or design project on traffic control/management related topics. Additional details and instructions will be made available during the first three lectures. Each team must adhere to the following key milestones/submittals via email submission (unless otherwise instructed):

<table>
<thead>
<tr>
<th>Due Date (tentative)</th>
<th>Description</th>
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<tbody>
<tr>
<td>9/9/2014</td>
<td>Draft Design Project Topic &amp; Abstract Due</td>
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<tr>
<td>9/10/2014</td>
<td>Lecturer Returns Comments on Topics &amp; Abstracts</td>
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<tr>
<td>9/16/2014</td>
<td>Revised Design Project Topic &amp; Abstract Due</td>
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<tr>
<td>9/17/2014</td>
<td>Approved to proceed on design project topic and scope</td>
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<tr>
<td>9/30/2014</td>
<td>Design Project – Table of Contents (TOC) Due</td>
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| 10/7/2014            | Design Project Progress Report #1 Due  
Team leaders to submit Progress Report #1 in memo format. |
| 10/14/2014           | Design Project - Working Draft Report #1 Due  
Team leaders to submit the first working draft (consistent with the draft TOC). Some chapters (i.e. Intro, Background, Problem Statement, and Methodology) in the working draft should be about 50% completed. Other chapters pending data collection and analysis should be at least 30% complete. Team leaders are responsible for proof-reading all submittals. |
| 10/21/2014           | Design Project Progress Report #2 Due  
Team leaders to submit Progress Report #2 in memo format. |
| 11/4/2014            | Design Project - Working Draft Report #2 Due  
Team leaders to submit the second working draft (consistent with the final TOC). Some chapters (i.e. Intro, Background, Problem Statement, Methodology) in the working draft should be about 90% completed. Other chapters pending data collection and analysis should be at least 50% complete. Team leaders are responsible for proof-reading all submittals. |
| 11/21/2014           | Design Project Final Working Draft Due  
Team leaders to submit the second working draft (consistent with the final TOC). Some chapters (i.e. Intro, Background, Problem Statement, Methodology, and data collection) should be 100% completed. Other chapters, i.e. data analyses and recommendations should be at least 75% complete. Team leaders are responsible for proof-reading all submittals. |
| 12/3/2014            | Design Project Presentations  
10-15 minutes of presentation and 10 minutes of Q&A per team. |
| 12/10/2013           | Final Report Due |
VI. Field Trips

In addition to class-related assignments to be conducted in the field, one or two tours will be arranged for this class. **The first tour is tentatively scheduled for September 19, 2014 Friday between 9 am to 3 pm.** Attendance in field trip(s) arranged during the regular lecture hours will be mandatory. Should a field trip is arranged outside of the regular lecture hours due to agency’s availability, attendance will be optional. Most facilities to be visited are highly advanced and not accessible by the public. Therefore, students should make every effort to attend each field trip. Please note that it may be necessary for you to carpool with other classmates since the school/instructor are not obligate to provide transportation. Up to three of the following facilities may be visited throughout this semester:

Option 1:
- Caltrans District 7 Regional Transportation Management Center (LARTMC) in Glendale
- City of Los Angeles ATSAC Center in Los Angeles
- Los Angeles County Transportation Management Center in Alhambra
- City of Pasadena Traffic Management Center

Option 2:
- Port of Long Beach
- Caltrans District 12 Transportation Management Center in Irvine
- City of Anaheim Traffic Management Center
- Disneyland Parking Management (contingent upon Disneyland’s approval)