

UNIVERSITY OF SOUTHERN CALIFORNIA  
**CE585 TRAFFIC ENGINEERING AND CONTROL**

**FALL SEMESTER 2017**

**COURSE SYLLABUS V.2 (UPDATED ON 8/20/2017)**

<b>INSTRUCTOR</b>	<a href="#">ERIC C. SHEN</a> <a href="mailto:Shen.Eric@gmail.com">Shen.Eric@gmail.com</a> Mobile/Text: 626-429-9004
<b>LECTURES</b>	<b>KAP 134 6:30-9:10PM WEDNESDAY</b>
<b>COMPUTER LAB</b>	<b>SYNCHRO/SIMTRAFFIC 9/HIGHWAY CAP SOFTWARE KAP-239 INSTRUCTIONAL COMPUTER LAB</b>
<b>FIELD WORK</b>	<b>TBD; MOSTLY CONDUCTED INDEPENDENTLY</b>
<b>OFFICE HOURS</b>	<b>5:00-6:00 PM WEDNESDAY PART-TIME LECTURERS' OFFICE (2<sup>ND</sup> FL, KAP200) OR BY APPOINTMENT</b>

**Class Description:**

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.

While single-occupant vehicular trips continue dominating urban landscapes, a growing number of government agencies and advocacies are aggressively promoting Complete Street practice by enhancing transit access, adding bike lanes, and improving pedestrian linkages. A walkable, bicycle-friendly, with efficient transit services are indicative of a healthy and vibrant community. Additionally, efficient movement of goods via trucks and rails from our ports and

intermodal terminals are equally important for any region's economic vitality. In order to accommodate different modes of road users within confined space, operating at different speeds, traffic engineers must continue to abide by established standards and focus on the number one priority – roadway safety. Traffic engineers must be willing to engage in transportation policy discussions, to develop new standards and update existing engineering practices, and to improve mobility for all users without compromising safety. It is not an easy task by any means.

With 25 years of hands-on experience in managing and developing multi-modal 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>). 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
- Sustainable Community/Complete Street Policies and Practice
- 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/>), 10 copies of HCS10 (version 6.6) is installed on desktop computers in KAP 239.
- Synchro (<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

Students are encouraged to secure a copy of the textbook throughout this class: **Traffic Engineering, 4/E**. Roger P. Roess, Elena S. Prassas, and William R. McShane. Prentice Hall, 2009. Most current practice and reference materials will be distributed electronically.

## III. STUDENT EVALUATION/HOMEWORK 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.

Assignments	40%
Midterm/Final exam(s)	20%
Team Research/Design Project	40%
TOTAL	100%

## IV. COURSE OUTLINE

SESSION #	LECTURE	<p style="text-align: center;"><b>ASSIGNMENTS</b></p> <p><b>1. Submit all homework via email in PDF format unless otherwise instructed.</b></p> <p><b>2. All submissions are due by 5pm of the date specified.</b></p>
<p style="text-align: center;"><b>#1</b> <b>8/23/17</b> <b>WED</b></p>	<p>Basic concepts and physical components of transportation systems.</p>	<p><b>Self-Introduction: DUE 8/21/2017 (Pass/Fail only, no grade)</b></p> <p><u>Homework #1:</u> 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. <b>DUE 9/20/2017 (Letter Grade)</b></p>
<p style="text-align: center;"><b>#2</b> <b>8/30/17</b> <b>WED</b></p>	<p>Inter-relations and inter-dependence between land use, policies, funding, and transportation.</p>	<p><u>Homework #2:</u> Summary Report on <i>“The U.S. is choking on its traffic and it’s going to get worse.”</i> <b>DUE 9/13/2017 (Letter Grade)</b>. Use template for the report.</p>
<p style="text-align: center;"><b>#3</b> <b>9/6/17</b> <b>WED</b></p>	<p>Sustainable Community &amp; Complete Street – Goals, Policies vs Implementation</p>	<p><u>Homework #3:</u> Group Assignment on Walkability Inventory. <b>DUE 9/27/2016 (Group Letter Grade)</b></p>
<p style="text-align: center;"><b>#4</b> <b>FRI 9/8/20017</b> <b>Make-Up Session</b></p>	<p>Technical Field Trip Details to be provided.</p>	<p><u>Homework #4:</u> Review and prepare a technical memo one proposed legislation (to be assigned). <b>DUE 9/27/17 (Letter grade)</b></p>
<p style="text-align: center;"><b>#5</b> <b>9/13/17</b> <b>WED</b></p>	<p>Guest Speakers</p>	<p><u>Homework #5:</u> Textbook questions: to be assigned on 9/21/17. <b>DUE 10/11/17 in class.</b> Hand calculations, show work on ENGINEERING PAPERS; no Excel or Word printouts. Numeric grade</p>
<p style="text-align: center;"><b>#6</b> <b>FRI 9/15/17</b> <b>Make-Up Session</b></p>	<p>Traffic Stream Characteristics Basic Statistical Concepts</p>	
<p style="text-align: center;"><b>#7</b> <b>9/20/17</b> <b>WED</b></p>	<p>Traffic Volume Studies Speed Travel Time &amp; Delay Studies Manual turning counts; automatic counts. Travel time and spot speed studies</p>	<p><u>Homework #6:</u> STOP Warrants Investigation. <b>DUE 10/11/17 in class. (Numeric/Letter Grade)</b></p>
<p style="text-align: center;">9/27/2017 <b>WED</b></p>	<p>Class to be rescheduled due to lecturer’s work travel</p>	
<p style="text-align: center;">10/4/2017 <b>WED</b></p>	<p>Class to be rescheduled due to lecturer’s work travel</p>	
<p style="text-align: center;"><b>#8</b> <b>10/11/17</b> <b>WED</b></p>	<p><b>Official traffic control devices; STOP warrants; MUTCD FIELD LECTURE</b></p>	<p><u>Homework #7:</u> Field notes. <b>Due 10/18/2017 in class. (Letter Grade)</b></p>
<p style="text-align: center;"><b>#9</b> <b>10/18/17</b></p>	<p>Traffic Signal Systems – Controller, Detection and Communication <b>Mid-term Exam</b></p>	

<p><b>#10</b> <b>10/25/17</b> <b>WED</b></p>	<p>Analysis of Signalized Intersections Signal Coordination &amp; Timing Charts Traffic Synchronization &amp; Preemption</p>	<p>Optimize traffic progression by Synchro 7.0; Develop signal timing parameters.</p> <p><u>Homework #6:</u> Conduct capacity analyses by HCS (Freeway; Non-signalized Intersection). <b>(Letter Grade). DUE 11/8/17 in class.</b></p>
<p><b>#11</b> <b>11/1/17</b> <b>WED</b></p>	<p>Practice and review of traffic impacts by development projects</p> <p>Intelligent Transportation Systems – System Design &amp; Integration</p>	<p>Optimize traffic progression by Synchro 7.0; Develop signal timing parameters.</p>
<p><b>#12</b> <b>11/8/17</b> <b>WED</b></p>	<p>Active Transportation &amp; Goods Movement</p>	<p><u>Homework #8:</u> Review and prepare a technical memo one a current transportation issue (to be assigned). DUE 11/15/17 (Letter grade)</p>
<p><b>#13</b> <b>11/15/17</b> <b>WED</b></p>	<p>Environmental Impacts</p>	<p><u>Homework #9:</u> Review and prepare a technical memo one a current transportation issue (to be assigned). DUE 11/29/17 (Letter grade)</p>
<p><b>#14</b> <b>11/22/17</b> <b>WED</b></p>	<p>THANKSGIVING – NO CLASS</p>	
<p><b>#15</b> <b>11/29/17</b> <b>WED</b></p>	<p><b>Comprehensive Project Presentation</b></p>	
<p><b>#16</b> <b>12/6/17</b> <b>WED</b></p>	<p><b>Final Exam</b></p>	

## V. Team Research Project

The composition of project team will be arranged based on the final enrollment of the 2017 fall class. Each team, up to four 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):

### Group Assignment

*Each team shall identify one member as the Point of Contact (POC). POC will be responsible for submitting progress reports and communicating with Lecturer.*

### Key Milestones

Due Date (tentative)	Description
8/30/17	Each team to send the name of POC to Lecturer
9/6/17	Draft research interests/problem statements
9/13/17	Finalize problem statements and the project topic
9/20/17	<b>Progress Report #1</b> <ol style="list-style-type: none"><li>1. Draft project schedule</li><li>2. Draft roles and responsibilities among team members</li><li>3. Issues, concerns, and projected activities until next progress report</li></ol>
9/28/17	<b>Progress Report #2</b> <ol style="list-style-type: none"><li>1. Draft Table of Contents (TOC)</li><li>2. Issues, concerns, and projected activities until next progress report</li></ol>
10/4/17	<b>Progress Report #3</b> <ol style="list-style-type: none"><li>3. Issues, concerns, and projected activities until next progress report</li></ol>
10/18/17	<b>Progress Report #4 &amp; Working Draft Report #1</b>
11/1/17	<b>Progress Report #5</b>
11/11/17	<b>Working Draft Report #2</b> <p>POCs to submit the second working draft (consistent with the final TOC). Some chapters (i.e. Intro, Background, Problem Statement, and Methodology) in the working draft should be about 90% completed. Other chapters pending data collection and analysis should be at least 50% complete. Each team is responsible for proof-reading all submittals.</p>
11/18/17	<b>Final Working Draft</b> <p>POCs to submit the second working draft (consistent with the final TOC). Some chapters (i.e. Intro, Background, Problem Statement, Methodology, data collection and analyses) should be 100% completed. Recommendations should be at least 75% complete. Each team is responsible for proof-reading all submittals.</p>

11/29/17	Design Project Presentations <i>15-20 minutes of presentation and 10 minutes of Q&amp;A per team.</i>
12/6/2017	Final Report Due

## VI. Field Trips [to be updated]

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 scheduled for **September 8, 2016 Friday** between 8 am to 3 pm. Attendance in field trip(s) arranged during the regular lecture hours will be mandatory.

Riding the chartered bus IS MANDATORY. You will not allowed to participate only a portion of the trip nor to drive solo due to the site access issues. All participants must sign and date the waiver prior to the trip.

## VII. Relevant Documents & Resources

***Note to students: Please do not solely rely on Wikipedia for reference. You may have to contact each city's engineering, planning or transportation departments to retrieve information. That is the part of your "real-world" training.***

### Lecturer's Expectations

Please participate in course discussion enthusiastically; communicate with me (in person, via email or phone call) openly; respond to my assignments/inquires promptly; and collaborate/coordinate/cooperate with your team members. These are fundamental skills in work place.

## VIII. Statement on Academic Conduct and Support Systems

### Academic Conduct

Plagiarism – presenting someone else's ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in SCampus in Section 11, Behavior Violating University Standards <https://scampus.usc.edu/1100-behavior-violating-university-standards-and-appropriatesanctions>.

Other forms of academic dishonesty are equally unacceptable. See additional information in SCampus and university policies on scientific misconduct, <http://policy.usc.edu/scientific-misconduct>.

Discrimination, sexual assault, and harassment are not tolerated by the university. You are encouraged to report any incidents to the *Office of Equity and Diversity* <http://equity.usc.edu> or to the *Department of Public Safety* <http://capsnet.usc.edu/department/department-public-safety/online-forms/contact-us>. This is important for the safety of the whole USC community.

Another member of the university community – such as a friend, classmate, advisor, or faculty member – can help initiate the report, or can initiate the report on behalf of another person. *The Center for Women and Men* <http://www.usc.edu/student-affairs/cwm/> provides 24/7 confidential support, and the sexual assault resource center webpage <http://sarc.usc.edu> describes reporting options and other resources.

### **Support Systems**

A number of USC's schools provide support for students who need help with scholarly writing. Check with your advisor or program staff to find out more. Students whose primary language is not English should check with the *American Language Institute* <http://dornsife.usc.edu/ali>, which sponsors courses and workshops specifically for international graduate students. *The Office of Disability Services and Programs* [http://sait.usc.edu/academicsupport/centerprograms/dsp/home\\_index.html](http://sait.usc.edu/academicsupport/centerprograms/dsp/home_index.html) provides certification for students with disabilities and helps arrange the relevant accommodations. If an officially declared emergency makes travel to campus infeasible, *USC Emergency Information* <http://emergency.usc.edu> will provide safety and other updates, including ways in which instruction will be continued by means of blackboard, teleconferencing, and other technology.