

UNIVERSITY OF SOUTHERN CALIFORNIA
CE585 TRAFFIC ENGINEERING AND CONTROL

FALL SEMESTER 2015

COURSE SYLLABUS V.1 (UPDATED ON 9/7/2015)

LECTURER	ERIC C. SHEN Shen.Eric@gmail.com Mobile/Text: 626-429-9004
LECTURES	KAP 137 6:30-9:10PM WEDNESDAY
COMPUTER LAB	SYNCHRO/SIMTRAFFIC 7/HIGHWAY CAP SOFTWARE KAP-239 INSTRUCTIONAL COMPUTER LAB
FIELD WORK	TBD; MOSTLY CONDUCTED INDEPENDENTLY
OFFICE HOURS	5:00-6:00 PM WEDNESDAY PART-TIME LECTURERS' OFFICE (2ND FL, KAP) OR BY APPOINTMENT

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 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 a 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 highly encouraged to purchase a copy of the textbook for this class. **Traffic Engineering, 4/E**. Roger P. Roess, Elena S. Prassas, and William R. McShane. Prentice Hall, 2009.

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%
Independent Research/Design Project	40%
TOTAL	100%

IV. COURSE OUTLINE

WEEKS	LECTURE	ASSIGNMENTS
1 8/26/15	Basic concepts and physical components of transportation systems.	<p>1. Submit all homework via email in PDF format unless otherwise instructed.</p> <p>2. All submissions are due by 5pm of the date specified.</p> <p><u>Self-Introduction:</u> DUE 8/26/2015 (Pass/Fail only, no grade)</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. DUE 9/22/2015 (Pass/Fail only, no grade)</p>
2* 9/2/2015	No class due to lecturer's business travel To be made-up on 9/25/2015 (field day)	<u>Homework #2:</u> Summary Report on "The U.S. is choking on its traffic and it's going to get worse." DUE 9/15/2015 (Letter Grade) . Use template for the report.
3 9/9/15	ITE Student Chapter Meeting in KAP 06:30 pm – 07:20 pm. Dinner to be provided. Room number to be announced. <u>Course Lecture:</u> Inter-relations and inter-dependence between land use, policies, funding, and transportation.	<u>Homework #3:</u> Group Assignment on Walkability Inventory. DUE 9/23/2015 (Group Letter Grade)
2* 9/11/2015 (Make-up Lecture)	Sustainable Community & Complete Street – Goals, Policies vs Implementation Traffic Stream Characteristics Basic Statistical Concepts	
4 9/16/15	Traffic Volume Studies Speed Travel Time & Delay Studies	Homework 4: Textbook questions: to be assigned on 9/16/2015. DUE 9/30/2015 in class. Hand calculations, show work on ENGINEERING PAPERS; no Excel or Word printouts. Numeric grade
5 & 6 Field Lectures 9/23/2015 9/30/15	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	Manual turning counts; automatic counts. Travel time and spot speed studies <u>Homework #5:</u> STOP Warrants Investigation. DUE 10/7/2015 in class. Numeric grade
7 & 8 10/7/15 10/14/15	Traffic Signal Systems – Controller, Detection and Communication; Analysis of Signalized Intersections	<u>Homework #6:</u> Conduct capacity analyses by HCS (Freeway; Non-signalized Intersection). (Pass/Fail only, no grade). DUE 10/21/2015 in class.

<p>9 & 10</p> <p>10/21/15 10/28/15</p>	<p>Signal Coordination & Timing Charts</p> <p>Mid-term Exam (or Guest Lecture on Traffic Management)</p>	<p>Optimize traffic progression by Synchro 7.0; Develop signal timing parameters</p>
<p>11 & 12</p> <p>11/4/15 11/11/15</p>	<p>11/4/2015: Guest lecture on Environmental Practice</p> <p>Traffic Synchronization & Preemption</p> <p>Practice and review of traffic impacts by development projects</p> <p>Intelligent Transportation Systems – System Design & Integration</p>	<p>Implement signal timing parameters in field; Fine-tuning parameters in field</p> <p>Measure of Effectiveness (MOE) – progression evaluation in field</p>
<p>13 & 14</p> <p>11/18/15 11/25/15</p>	<p>Intermodal Transportation Planning and Traffic Management</p> <p>Environmental Considerations</p> <p>No class on 11/26/2015</p>	<p><u>Homework #7</u>: Review and prepare a technical memo on proposed legislation (to be assigned). DUE 9/29/2015 (Letter grade)</p>
<p>15</p> <p>12/2/15</p>	<p>Comprehensive Design Project Presentations</p>	
<p>12/9/15</p>	<p>Final Exam</p>	

V. Team Research Project

On July 12, 2015, The Los Angeles Times published a story “[Walking in L.A.: Times analysis finds the county's 817 most dangerous intersections](#)” by By Laura J. Nelson, Armand Emamdjomeh and Joseph Serna. Five intersections near the USC campus were identified among the 817 most dangerous intersections in Los Angeles County. These five intersections are:

- A. Figueroa Street & Adams Blvd
- B. Figueroa Street & Jefferson Blvd
- C. Figueroa Street & Martin Luther King Blvd
- D. Jefferson Blvd & Normandie Ave
- E. Jefferson Blvd and Western Ave

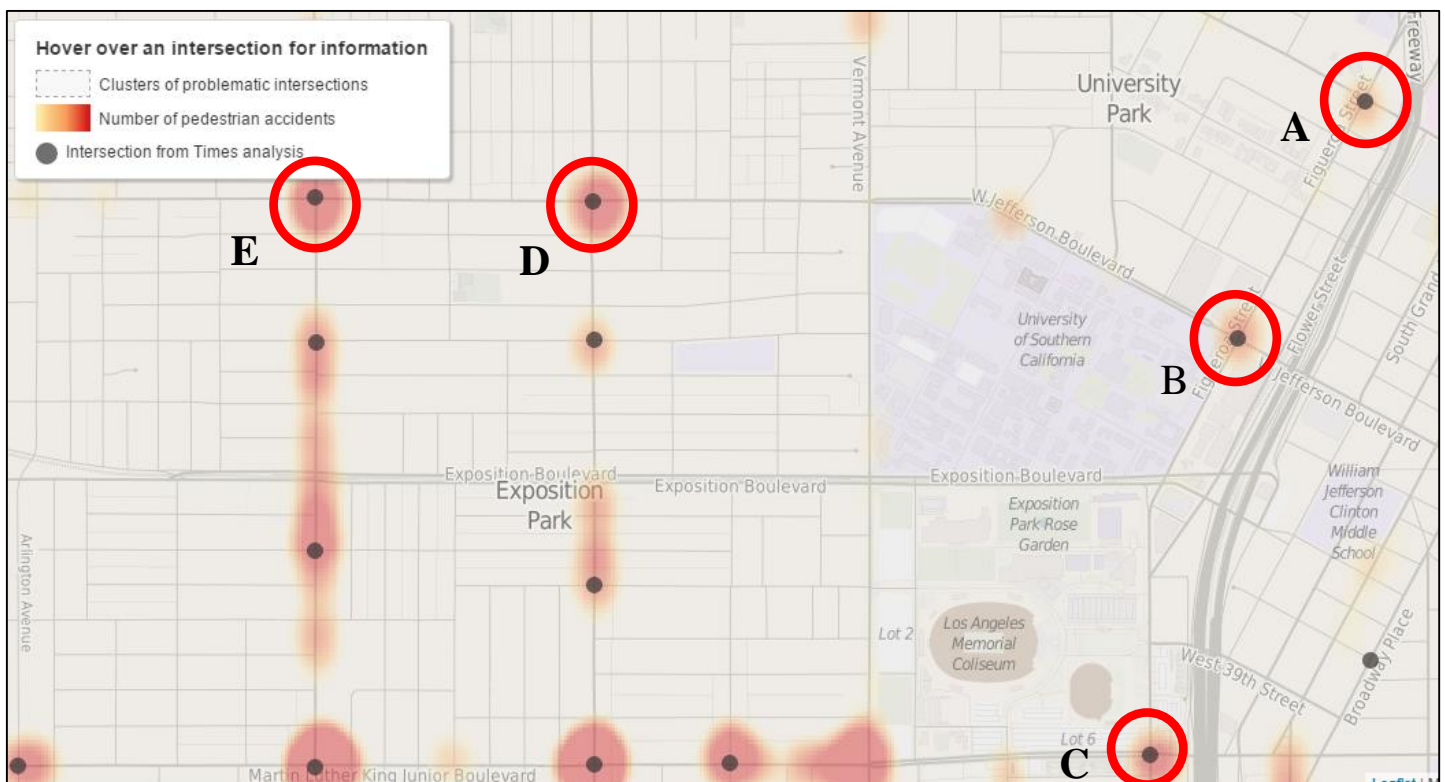


Image Capture: <http://graphics.latimes.com/la-pedestrians/>

In this team research project, students will be assigned to five groups by Lecturer. Each group will carefully examine the methodology and analyses by The Los Angeles Time. Traffic collision records (raw records) for each of the five intersections will be made, through Lecturer, to the City of Los Angeles Department of Transportation. To the extent possible, common traffic engineering techniques, methodologies, and standards should be used in validation. Each group will document its findings with respect to the report’s methodology, use of data, and observations.

Based on the raw data made available to each group, each group will then conduct site-specific field review, review signal and striping plans, and formulate mitigation measures. At the

conclusion of this team research project, each team will present a comprehensive report on its review on methodology used by The Los Angeles Time, site-specific investigation and recommendations.

Group Assignment

Team	Team Members			
	(For security reason, only the last four digits of student IDs are shown)			
A	5716	5592	9673	
B	6992	9417	4460	
C	1879	6541	6627	
D	0643	6985	8788	7081
E	8672	9719	7754	8861

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
9/11/2015	Each team to send the name of POC to Lecturer
9/15/2015	Progress Report #1 <ol style="list-style-type: none"> Draft project schedule Draft roles and responsibilities among team members
9/29/2015	Progress Report #2 <ol style="list-style-type: none"> Proposed approach to review on The Los Angeles Times methodology, analyses, and recommendations Issues, concerns, and projected activities until next progress report
10/6/2015	Progress Report #3 <ol style="list-style-type: none"> Draft Table of Contents (TOC) Draft report on The Los Angeles Times methodology, analyses, and recommendations. Issues, concerns, and projected activities until next progress report
10/20/2015	Progress Report #4 & Working Draft Report #1 <ol style="list-style-type: none"> Proposed approach to analyze the subject intersection by using LADOT traffic collision raw data and any additional considerations (i.e., signal and striping plans, signal timing, bus schedules, etc.) Draft field review and observation POCs 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. Each team is responsible for proof-reading all submittals. Issues, concerns, and projected activities until next progress report

11/3/2015	<p>Progress Report #5</p> <ol style="list-style-type: none"> 1. Draft report on traffic safety records, probable causes, and possible mitigations at the subject intersection. 2. Issues, concerns, and projected activities until next progress report
11/10/2015	<p>Working Draft Report #2</p> <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>
11/17/2015	<p>Final Working Draft</p> <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>
12/2/2015	<p>Design Project Presentations</p> <p><i>15-20 minutes of presentation and 10 minutes of Q&A per team.</i></p>
12/9/2015	<p>Final Report Due</p>

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 25, 2015 Friday between 9 am to 3 pm. Attendance in field trip(s) arranged during the regular lecture hours will be mandatory.

The tentative itinerary is listed below:

1. ~~08:15-08:30 — Students meet up in front of KAP, aboard bus~~
2. ~~08:30-10:00 — Depart for Caltrans District 12 Transportation Management Center (TMC) at [6681 Marine Way, Irvine, CA 92618](#) (appx 50 miles)~~
3. ~~10:00-11:30 — Briefing by Caltrans staff and tour the TMC~~
4. ~~11:30-12:00 — Depart for ARTIC Construction Office (exact address to be provided) near [Honda Center in Anaheim](#) (appx 13 miles)~~
5. ~~12:00-13:30 — Receive briefing by ARTIC construction team and tour outside of the site~~
6. ~~13:30-14:00 — Depart for the City of Anaheim Traffic Management Center at [201 S. Anaheim Boulevard, Anaheim, CA 92805](#) (appx 5 miles)~~
7. ~~14:00-15:30 — Briefing by Anaheim staff and tour TMC~~
8. ~~15:30-16:45 — Return to KAP~~

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.