

CE 585 – Traffic Engineering and Control

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Office Hours: Thursday 11:00 am-12:00 pm,
Tuesday 2:00 pm-3:00 pm and online by
appointment
Office hour zoom link:
TBA

Units: 3
Term: Spring 2023
Schedule: Tue 11:30 am-1:50 pm
Location: TBA
Teaching Assistant: NA

Catalogue Course Description

Modern traffic engineering theory and practice; traffic streams; control techniques and policies for multiple traffic modalities; intersection signal timing; capacity and optimization; efficiency and safety.

Expanded Course Description

The objective of this course is to introduce latest concepts, techniques, and tools for traffic engineering studies. This course provides students with the knowledge and analytical skills to cope with modern traffic operation, control, and safety problems. Topics to be covered include traffic flow theory, intersection signal timing and optimization, capacity and level of service measurements for intersections and highways. The course also introduces fundamentals of traffic control strategies for air, port, and rail traffic operations and management.

Learning Objectives and Outcomes

This class is built on real-world transportation principles and practices. It is critical to learn a wide range of techniques to address traffic control and operations in different aspects, including safety and sustainability. Below are the necessary objectives that students will learn to be able to define, model, and solve traffic related problems:

- Understand the fundamentals of traffic stream for different modes of transportation
- Distinguish different types of traffic control techniques and policies
- Interpret the full cycle of intersection signal timing and capacity control
- Evaluate the level of service criteria for different segments of highways
- Formulate and optimize intersection timing plans

The learning objectives will be assessed using class assignments, homework, and two exams.

Prerequisite(s): None

Co-Requisite(s): N/A

Concurrent Enrollment: N/A

Recommended Preparation: CE471

Course Notes

All the course materials including class assignments, lecture slides, homework, solutions, and scores will be posted on the class Blackboard website.

Technological Proficiency and Hardware/Software Required

There are no special software or other technical proficiency requirements.

Required Readings and Supplementary Materials

The following textbooks are recommended and may be purchased in the USC Bookstore.

“Traffic and Highway Engineering”, Garber & Hoel, 5th edition, Publisher: Cengage Learning, 2015.

“Traffic engineering”, Roess, Roger P., Elena S. Prassas, and William R. McShane. Publisher: Pearson/Prentice Hall, 2004.

Description and Assessment of Assignments

The following components are used to assess the outcomes:

Homework (25%): At the end of each topic, homework will be available, and they are due one week from the assignment date, unless otherwise indicated. Students are expected to complete all homework on time. Late assignments are accepted only for up to 24 hours after the due date with a 20% penalty. Homework must be electronically submitted to Blackboard, clearly handwritten or typed and show all work. Many students choose to type up written answers but handwrite mathematical answers. Homework should be solved independently. If there is any evidence of cheating, relevant University policies and regulations will be applied. Homework will be graded based on organization, neatness, accuracy, and effort.

Class Assignments (25%): Class activities are evaluated using class assignments. Class assignments will be assigned during the class and are due by end of the class. Time is allotted during each class period to discuss and solve the class assignment questions. Late assignments are accepted only by the end of the class day with a 20% penalty. Grades will be based on the involvement in these class activities and the quality of the solutions.

Mid-Term Exam (25%): There will be one closed-book midterm exam held during our regularly scheduled class time on **Wednesday, Feb 21st, 11:30am-2:50pm**. Students need a scientific calculator for this exam. In case the midterm exam is missed, an official, acceptable, and verified excuse must be presented to be able to make up the exam as early as possible. This excuse must be recorded within 24 hours. An unexcused failure to take the exam will result in a zero for the exam.

Final Exam (25%): There will be one closed -book final exam held on **Tuesday May 9th, 11:00am-1:00pm** in the class. The final exam is not cumulative, though the nature of the material is. There will be absolutely no exceptions to the final exam’s date and time, so plan accordingly. The date and time for the final exam are dictated by the University (see <https://classes.usc.edu/term-20221/finals/>).

Grading Breakdowns

Final grades will be calculated as follows:

Assignment	% of Grade
Homework	25%
Class Assignments	25%
Mid-Term Exam	25%
Final Exam	25%
TOTAL	100%

Assignment Rubrics and Grading

Assignment grading rubric and will be available with the assignment solution in blackboard. Grades will be posted on blackboard within two weeks after each assignment due date.

Additional Policies

Students are expected to assist in maintaining a classroom environment, which is conducive to learning. In order to assure that all students have an opportunity to gain from time spent in class, unless otherwise approved by the instructor, students are prohibited from using cellular phones and MP3 players in class, laptops for nonrelated class activities, or engaging in any other form of distraction. Inappropriate behavior in the classroom shall result in, minimally, a request to leave class. Attendance is not required but will be monitored throughout the semester. Each student is required to be on time. Incidences of excessive absence will be dealt with in a manner consistent with the University policy and procedures.

Course Schedule: A Weekly Breakdown

*This schedule serve as a guideline. It may be changed at the instructor’s discretion

	Topics	Readings	Assignments and Deliverables
Week 1 Jan 10	Introduction to Transportation Modes and Characteristics	NA	NA
Week 2 Jan 17	Traffic Stream Characteristics <ul style="list-style-type: none"> - Relationships among flow rate, speed, and density - Shock waves and gap acceptance 	Garber Textbook- Chapter 6 Roess Textbook	HW1 is assigned CA1 is assigned and due

		Chapter 5	
Week 3 Jan 24	Highway Capacity and Level of Service <ul style="list-style-type: none"> - Capacity of a segment - Level of service of a segment - V/C ratio 	Garber Textbook- Chapter 9 Roess Textbook Chapter 7	HW1 is due HW2 is assigned
Week 4 Jan 31	Highway Capacity and Level of Service <ul style="list-style-type: none"> - Capacity of weaving area - Capacity of multilane highways 	Roess Textbook Chapter 29	HW2 is due HW3 is assigned CA2 is assigned and due
Week 5 Feb 7	Highway Traffic Safety <ul style="list-style-type: none"> - Crash patterns - Safety impacts of intelligent transportation system 	Garber Textbook- Chapter 5 Roess Textbook Chapter 12	HW3 is due HW4 is assigned
Week 6 Feb 14	Principles of Intersection Signalization <ul style="list-style-type: none"> - Types of intersection control - Pre-timed signal phase plan 	Garber Textbook- Chapter 8 Roess Textbook Chapter 18	HW4 is due CA3 is assigned and due
Week 7 Feb 21	Midterm exam	NA	NA
Week 8 Feb 28	Fundamentals of Signal Timing and Design: Pre-timed Signals <ul style="list-style-type: none"> - Vehicular requirement - Pedestrian phase 	Roess Textbook Chapter 19	HW5 is assigned
Week 9 Mar 7	Fundamentals of Actuated Signals and Signal coordination <ul style="list-style-type: none"> - Actuated control features and operation - Types of progression 	Roess Textbook Chapters 20 and 21	HW5 is due HW6 is assigned CA4 is assigned and due
Week 10 Mar 14	Spring recess- no class	NA	NA
Week 11 Mar 21	Capacity and Level of Service Analysis for Signalized Intersections <ul style="list-style-type: none"> - Level of Service criteria - Model structure for pre-timed signals 	Garber Textbook- Chapter 10 Roess Textbook Chapter 22	HW6 is due HW7 is assigned
Week 12 Mar 28	Other Intersections <ul style="list-style-type: none"> - Interchanges - Unsignalized intersections - Roundabouts 	Roess Textbook Chapters 31 and 25	HW7 is due HW8 is assigned CA5 is assigned and due
Week 13 Apr 4	Modern Urban Streets: Complete Streets <ul style="list-style-type: none"> - Level of Service of facilities 	Roess Textbook Chapter 24	HW8 is due HW9 is assigned
Week 14 Apr 11	New Concepts and Methods in Air Traffic Management <ul style="list-style-type: none"> - Coordination of air traffic 	Instructor's handout	HW9 is due HW10 is assigned CA6 is assigned and due

	- Delay		
Week 15 Apr 18	Port planning and navigation - Water and land area management - Port collecting traffic flow	Instructor's handout	HW10 is due
Week 16 Apr 25	Fundamental of rail transportation - Traffic safety - Reliability	Instructor's handout	CA7 is assigned and due
Week 17 May 9	Final exam at 11:00 am	NA	NA

Statement on Academic Conduct and Support Systems

Academic Integrity:

The University of Southern California is a learning community committed to developing successful scholars and researchers dedicated to the pursuit of knowledge and the dissemination of ideas. Academic misconduct, which includes any act of dishonesty in the production or submission of academic work, comprises the integrity of the person who commits the act and can impugn the perceived integrity of the entire university community. It stands in opposition to the university's mission to research, educate, and contribute productively to our community and the world.

All students are expected to submit assignments that represent their own original work, and that have been prepared specifically for the course or section for which they have been submitted. You may not submit work written by others or "recycle" work prepared for other courses without obtaining written permission from the instructor(s).

Other violations of academic integrity include, but are not limited to, cheating, plagiarism, fabrication (e.g., falsifying data), collusion, knowingly assisting others in acts of academic dishonesty, and any act that gains or is intended to gain an unfair academic advantage.

The impact of academic dishonesty is far-reaching and is considered a serious offense against the university. All incidences of academic misconduct will be reported to the Office of Academic Integrity and could result in outcomes such as failure on the assignment, failure in the course, suspension, or even expulsion from the university.

For more information about academic integrity see [the student handbook](#) or the [Office of Academic Integrity's website](#), and university policies on [Research and Scholarship Misconduct](#).

Please ask your instructor if you are unsure what constitutes unauthorized assistance on an exam or assignment, or what information requires citation and/or attribution.

Students and Disability Accommodations:

USC welcomes students with disabilities into all of the University's educational programs. The Office of Student Accessibility Services (OSAS) is responsible for the determination of appropriate accommodations for students who encounter disability-related barriers. Once a student has completed the OSAS process (registration, initial appointment, and submitted documentation) and accommodations are determined to be reasonable and appropriate, a Letter of Accommodation (LOA) will be available to generate for each course. The LOA must be given to each course instructor by the student and followed up with a discussion. This should be done as early in the semester as possible as accommodations are not retroactive. More information can be found at osas.usc.edu. You may contact OSAS at (213) 740-0776 or via email at osasfrontdesk@usc.edu.

Support Systems:

[Counseling and Mental Health](#) - (213) 740-9355 – 24/7 on call

Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention.

[988 Suicide and Crisis Lifeline](#) - 988 for both calls and text messages – 24/7 on call

The 988 Suicide and Crisis Lifeline (formerly known as the National Suicide Prevention Lifeline) provides free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week, across the United States. The Lifeline is comprised of a national network of over 200 local crisis centers, combining custom local care and resources with national standards and best practices. The new, shorter phone number makes it easier for people to remember and access mental health crisis services

(though the previous 1 (800) 273-8255 number will continue to function indefinitely) and represents a continued commitment to those in crisis.

[Relationship and Sexual Violence Prevention Services \(RSVP\)](#) - (213) 740-9355(WELL) – 24/7 on call

Free and confidential therapy services, workshops, and training for situations related to gender- and power-based harm (including sexual assault, intimate partner violence, and stalking).

[Office for Equity, Equal Opportunity, and Title IX \(EEO-TIX\)](#) - (213) 740-5086

Information about how to get help or help someone affected by harassment or discrimination, rights of protected classes, reporting options, and additional resources for students, faculty, staff, visitors, and applicants.

[Reporting Incidents of Bias or Harassment](#) - (213) 740-5086 or (213) 821-8298

Avenue to report incidents of bias, hate crimes, and microaggressions to the Office for Equity, Equal Opportunity, and Title for appropriate investigation, supportive measures, and response.

[The Office of Student Accessibility Services \(OSAS\)](#) - (213) 740-0776

OSAS ensures equal access for students with disabilities through providing academic accommodations and auxiliary aids in accordance with federal laws and university policy.

[USC Campus Support and Intervention](#) - (213) 740-0411

Assists students and families in resolving complex personal, financial, and academic issues adversely affecting their success as a student.

[Diversity, Equity and Inclusion](#) - (213) 740-2101

Information on events, programs and training, the Provost's Diversity and Inclusion Council, Diversity Liaisons for each academic school, chronology, participation, and various resources for students.

[USC Emergency](#) - UPC: (213) 740-4321, HSC: (323) 442-1000 – 24/7 on call

Emergency assistance and avenue to report a crime. Latest updates regarding safety, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible.

[USC Department of Public Safety](#) - UPC: (213) 740-6000, HSC: (323) 442-1200 – 24/7 on call

Non-emergency assistance or information.

[Office of the Ombuds](#) - (213) 821-9556 (UPC) / (323-442-0382 (HSC)

A safe and confidential place to share your USC-related issues with a University Ombuds who will work with you to explore options or paths to manage your concern.

[Occupational Therapy Faculty Practice](#) - (323) 442-2850 or otfp@med.usc.edu

Confidential Lifestyle Redesign services for USC students to support health promoting habits and routines that enhance quality of life and academic performance.