

CE 583 - Design of Transportation Infrastructure

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Units: 4
Term: Spring 2025
Schedule: Tue, Thu 9:00-10:50 am
Location: VHE 206
Teaching Assistant: TBA

Catalogue Course Description

Planning, design, staging, construction, and maintenance of the public works and facilities for land and air transportation

Expanded Course Description

This course provides students with the basic knowledge necessary for planning, design, construction and operation of transportation facilities, including Highway and Airport facilities. However, the main emphasis will be on the Highway facility. This course is primarily designed for graduate engineering students. The material learned will provide the basic skill set that will help students in the process of development of transportation projects from initiation to completion and understanding of the factors that may influence those projects such as social, economic and environmental considerations.

Learning Objectives and Outcomes

Transportation projects are usually complex and involve collaborative process. Developing of the project is challenging and all the steps including defining the objective, planning, data collection, design, construction, and monitoring can have significant influence on the final outcome of the project and its success. These steps are organized by a schedule with phases and milestones and each phase deals with an increasing level of design details to define the final project scope. The design engineer needs to have the necessary knowledge of how to coordinate the multi disciplinary activities required in each project phase. At the conclusion of each phase, the project scope must be reviewed to ensure that it addresses the project needs. The necessary skills students need to learn to be able to develop transportation projects are:

- Distinguish different modes of transportation systems and their elements;
- Interpret the full cycle of project development from planning to construction;
- Formulate and develop high level and detailed highway design and intersection design problems.
- Implement the environmental, social, and economic factors involved in design decisions;
- Interpret and analyze the elements of geometric, pavement, and hydraulics design involved in highway design;
- Apply the safety aspects of highway design into the design process;
- Study the elements of airport design to efficiently accommodate air traffic;

The learning objectives will be assessed using assignments, homeworks, exams, and the project.

Prerequisite(s): None

Co-Requisite(s): None

Concurrent Enrollment: None

Recommended Preparation: CE 471, CE 457; and probability and statistics on the level of CE 408.

This course is primarily for graduate engineering students and students should have the equivalent of an undergraduate engineering background. It is not appropriate for applied social science students unless they have an undergraduate engineering background.

Course Notes

All the course materials including assignments, lecture slides, homeworks, 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.

Readings and Supplementary Materials

The following textbook is recommended and may be purchased in the USC Bookstore.

Textbook:

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

References:

"Highway Design Manual", California Transportation Department (CALTRANS), 2016.

"A Policy on Geometric Design of Highways and Streets", AASHTO, 6th Edition, 2011.

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 day. Time is allotted during each class period to discuss the class assignment questions. Late assignments are accepted only for up to 24 hours after the due date with a 20% penalty. Grades will be based on the involvement in these class activities and the quality of the solutions. They are open-book.

Exam I (25%): There will be one closed-book exam held during our regularly scheduled class time on **Tuesday Feb 27th** class time. 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.

Exam II (25%): There will be a closed -book exam held on **April 25th at 9:00 am** in the class. This 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.

Grading Breakdown

Assignment	% of Grade
Homework	25%
Class Assignments	25%
Exam I	25%
Exam II	25%
TOTAL	100%

Course Schedule: A Weekly Breakdown

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

Week	Topics/Daily Activities	Readings	Deliverable/ Due Dates
1	Introduction and Transportation Systems and Organizations	Text book- Chapter 1 and 2	
2	Transportation Systems and Organizations	Text book- Chapter 2	
3	Geometric Design of Highway facilities - Vertical Alignment	Text book- Chapter 15	HW 1 is assigned
4	Geometric Design of Highway facilities - Vertical Alignment/ Horizontal Alignment	Text book- Chapter 15	HW 1 is due CA 1 is assigned and due
5	Geometric Design of Highway facilities - Horizontal Alignment	Text book- Chapter 15	HW 2 is assigned CA 2 is assigned and due
6	Intersection Design	Text book- Chapter 7	HW 2 is due
7	Intersection Design	Text book- Chapter 7	HW 3 is assigned
8	Exam I and Review		HW 3 is due
9	No Class- Spring Recess		
10	Design of Flexible Highway Pavements	Text book- Chapter 19	HW 4 is assigned CA 3 is assigned and due
11	Design of Rigid Pavements	Text book- Chapter 20	HW 4 is due HW 5 is assignend
12	Highway Drainage	Text book- Chapter 16	HW 5 is due CA 4 is assigned and due
13	Other Transportation Facilities	Additional Handouts	
14	Airport Planning and Design	Additional Handouts	
15	Exam II and Review		
Final	Final Exam Week	Refer to the final exam schedule in the USC Schedule of Classes at www.usc.edu/soc .	

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.

Course Content Distribution and Synchronous Session Recordings Policies

USC has policies that prohibit recording and distribution of any synchronous and asynchronous course content outside of the learning environment.

Recording a university class without the express permission of the instructor and announcement to the class, or unless conducted pursuant to an Office of Student Accessibility Services (OSAS) accommodation. Recording can inhibit free discussion in the future, and thus infringe on the academic freedom of other students as well as the instructor. ([Living our Unifying Values: The USC Student Handbook](#), page 13).

Distribution or use of notes, recordings, exams, or other intellectual property, based on university classes or lectures without the express permission of the instructor for purposes other than individual or group study. This includes but is not limited to providing materials for distribution by services publishing course materials. This restriction on unauthorized use also applies to all information, which had been distributed to students or in any way had been displayed for use in relationship to the class, whether obtained in class, via email, on the internet, or via any other media. ([Living our Unifying Values: The USC Student Handbook](#), page 13).

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.