

## **CE 583 - Design of Transportation Facilities**

**Instructor: Roxana Javid, Ph.D.**  
**Office: KAP 200A**  
**Office Hours: Mon 2:00 pm-4:00 pm and  
online by appointment**  
**Email: rjavid@usc.edu**

**Units: 4**  
**Term: Spring 2022**  
**Schedule: Mon,Wed 10:00-11:50 am**  
**Location: VHE 214**  
**Teaching Assistant: N/A**

### **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 descisions;
- 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 accomodate 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 (15%):** 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 (15%):** 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. They are open-book.

**Research Paper (20%):** Students will be required to complete a group research paper. The topic can be chosen from a list of proposed research topics. Students are also welcome to suggest their own topic title, but the instructor must approve this. Project tasks and timeline are available later in the class. Grades are assigned based on the project tasks and details will be discussed with you in the class. Students will receive feedback on each task. The final research report shall be in the style of an academic paper with citations and is due on the last week of the class. All the groups will present their research findings and share their results with the rest of the class. All the member of the group are required to participate in the final research presentation.

**Mid-Term Exam (25%):** There will be one closed-book midterm exam held during our regularly scheduled class time on **Wednesday, March 2<sup>nd</sup>, 10:00am-11:50am**. 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 **Monday May 9<sup>th</sup>, 8:00am-10:00am** 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 Breakdown

Final grades will be calculated as follows:

Assignment	% of Grade
Homeworks	15%
Class Assignments/Quizzes	15%
Research Paper	20%
Mid-Term Exam	25%
Final Exam	25%
<b>TOTAL</b>	<b>100%</b>

## Grading Scale

Course final grades will be determined using the following scale:

A	A-	B+	B	B-	C+	C	C-	D+	D	D-	F
95-100	90-94	87-89	83-86	80-82	77-79	73-76	70-72	67-69	63-66	60-62	59 and below

This scale is presented for the sake of completeness. Courses in which students earn grades below a C cannot be presented for credit toward graduation in a USC graduate program, though the course grade remains part of the students graduate GPA.

## Assignment Rubrics and Grading

The rubric for oral presentation of the research paper as well as the research paper outline including the tasks and timeline will be provided during the class. Grades will be posted on class web page within two weeks after each assignment submission.

## 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 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/Daily Activities	Readings	Deliverable/ Due Dates
<b>Week 1</b> Jan 10 and Jan 12	<b>Introdution and Transportation Systems and Organizations</b>	Text book- Chapter 1 and 2	
<b>Week 2</b> Jan 17 and Jan 19	<b>No Class – Martin Luther King, Jr. Day Transportation Systems and Organizations</b>	Text book- Chapter 2	
<b>Week 3</b> Jan 24 and Jan 26	<b>Geometric Design of Highway facilities</b> - Vertical Alignment	Text book- Chapter 15	HW 1 is assigned
<b>Week 4</b> Jan 31 and Feb 2	<b>Geometric Design of Highway facilities</b> - Vertical Alignment/ Horizontal Alignment	Text book- Chapter 15	HW 1 is due CA 1 is assigned and due
<b>Week 5</b> Feb 7 and 9	<b>Geometric Design of Highway facilities</b> - Horizontal Alignment	Text book- Chapter 15	HW 2 is assigned CA 2 is assigned and due
<b>Week 6</b> Feb 14 and 16	<b>Intersection Design</b>	Text book- Chapter 7	HW 2 is due
<b>Week 7</b> Feb 21 and Feb 23	<b>No Class- Presidents Day Intersection Design</b>	Text book- Chapter 7	HW 3 is assigned
<b>Week 8</b> Feb 28 and Mar 2	<b>Review and Midterm Exam</b>		HW 3 is due
<b>Week 9</b> Mar 7 and Mar 9	<b>Design of Flexible Highway Pavements</b>	Text book- Chapter 19	HW 4 is assigned
<b>Week 10</b> Mar 14 and Mar 16	<b>No Class- Spring Recess</b>		
<b>Week 11</b> Mar 21 and Mar 23	<b>Design of Flexible Highway Pavements</b>	Text book- Chapter 19	HW 4 is due CA 3 is assigned and due
<b>Week 12</b> Mar 28 and Mar 30	<b>Design of Rigid Pavements</b>	Text book- Chapter 20	HW 5 is assignend
<b>Week 13</b> Apr 4 and Apr 6	<b>Highway Drainage</b>	Text book- Chapter 16	HW 5 is due CA 4 is assigned and due
<b>Week 14</b> Apr 11 and Apr 13	<b>Other Transportation Facilities</b>	Additional Handouts	
<b>Week 15</b> Apr 18 and Apr 20	<b>Airport Planning and Design</b>	Additional Handouts	
<b>Week 16</b> Apr 25 and Apr 27	<b>Research Paper Presentations And Review</b>		Research Paper due
<b>Week 17</b> May 9	<b>Final exam</b>		

## 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 Part B, Section 11, “Behavior Violating University Standards” [policy.usc.edu/scampus-part-b](https://policy.usc.edu/scampus-part-b). Other forms of academic dishonesty are equally unacceptable. See additional information in SCampus and university policies on scientific misconduct, [policy.usc.edu/scientific-misconduct](https://policy.usc.edu/scientific-misconduct).

### Support Systems:

*Technical Blackboard and Zoom Assistance*  
<https://keepsteaching.usc.edu/>

*Campus Support and Intervention*  
<https://campussupport.usc.edu/>

*Kortschak Center for Learning and Creativity*  
<https://kortschakcenter.usc.edu/>

*USC Libraries*  
<https://libraries.usc.edu/covid-19-library-support-online-teaching-and-research>

*USC writing Center*  
<https://dornsife.usc.edu/writingcenter>

*Student Health Counseling Services - (213) 740-7711 – 24/7 on call*  
[engemannshc.usc.edu/counseling](https://engemannshc.usc.edu/counseling)  
Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention.

*National Suicide Prevention Lifeline - 1 (800) 273-8255 – 24/7 on call*  
[suicidepreventionlifeline.org](https://suicidepreventionlifeline.org)  
Free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week.

*Relationship and Sexual Violence Prevention Services (RSVP) - (213) 740-4900 – 24/7 on call*  
[engemannshc.usc.edu/rsvp](https://engemannshc.usc.edu/rsvp)  
Free and confidential therapy services, workshops, and training for situations related to gender-based harm.

*Office of Equity and Diversity (OED) | Title IX - (213) 740-5086*  
[equity.usc.edu](https://equity.usc.edu), [titleix.usc.edu](https://titleix.usc.edu)  
Information about how to get help or help a survivor of harassment or discrimination, rights of protected classes, reporting options, and additional resources for students, faculty, staff, visitors, and applicants. The university prohibits discrimination or harassment based on the following protected characteristics: race, color, national origin, ancestry, religion, sex, gender, gender identity, gender expression, sexual orientation, age, physical disability, medical condition, mental disability, marital status, pregnancy, veteran status, genetic information, and any other characteristic, which may be specified in applicable laws and governmental regulations.

*Bias Assessment Response and Support - (213) 740-2421*  
[studentaffairs.usc.edu/bias-assessment-response-support](https://studentaffairs.usc.edu/bias-assessment-response-support)  
Avenue to report incidents of bias, hate crimes, and microaggressions for appropriate investigation and response.

*The Office of Disability Services and Programs - (213) 740-0776*

[dsp.usc.edu](http://dsp.usc.edu)

Support and accommodations for students with disabilities. Services include assistance in providing readers/notetakers/interpreters, special accommodations for test taking needs, assistance with architectural barriers, assistive technology, and support for individual needs.

*USC Support and Advocacy - (213) 821-4710*

[studentaffairs.usc.edu/ssa](http://studentaffairs.usc.edu/ssa)

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

*Diversity at USC - (213) 740-2101*

[diversity.usc.edu](http://diversity.usc.edu)

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*

[dps.usc.edu](http://dps.usc.edu), [emergency.usc.edu](http://emergency.usc.edu)

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) 442-120 – 24/7 on call*

[dps.usc.edu](http://dps.usc.edu)

Non-emergency assistance or information.