

ITP 477 – Software-Based Engineering Design of Roadways

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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: Thu 12:00 pm- 3:40 pm
Location: TBA
Teaching Assistant: NA

Catalogue Course Description

Highway geometric and hydraulic design; OpenRoads Designer software; Earthwork; Project estimations; Highway Design Manual principles; Profile and section views; Comprehensive 3D roadway models.

Expanded Course Description

The objective of this course is to introduce latest concepts, techniques, and tools for design of highways using the OpenRoad Designer software. This course provides students with the knowledge and analytical skills to become familiar with principals of geometric highway design, highway drainage design, and project estimates in OpenRoad Designer, which has 3D design visualization and comprehensive functioned design application.

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 different aspects of highway design, including vertical and horizontal curve, superelevation, and drainage design as well as cost estimation. Below are the necessary objectives that students will learn to be able to model and design highways using the OpenRoad Designer:

- Understand the fundamentals highway geometric design and safety
- Orient students to the OpenRoad Designer software and familiarize them with its capabilities to support engineering design of roadway
- Implement the Highway Design Manual's principles into the OpenRoad Designer software
- Analyze the elements of geometric design involved in highway design
- Generate profile and section views
- Create comprehensive 3D models of the designed roadway

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

Bentley OpenRoad Designer Software is available to students for free. You need to create a student account using their USC Email address here (<https://www.bentley.com/>) and download the software.

Required Readings and Supplementary Materials

The following textbooks are recommended and may be purchased in the USC Bookstore. *“OpenRoad Designer”*, Samuel D. Nugent, W Todd Stutts, Publisher: CAD Productivity Incorporated, 2019.

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

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. 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 in-lab open-book midterm exam held during our regularly scheduled class time during **Week 7**. 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 in-lab open-book final exam held on at the **date/time the University assigns for this 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://usc.edu/soc>).

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 serves as a guideline. It may be changed at the instructor's discretion

	Topics	Readings	Assignments and Deliverables
Week 1	Software Orientation <ul style="list-style-type: none"> - Configuration and set up - Interface 	NA	NA
Week 2	Terrain Models <ul style="list-style-type: none"> - Display - Tracking 	Nugent Textbook Chapter 3	HW1 is assigned
Week 3	Horizontal Geometry <ul style="list-style-type: none"> - Stationing - Horizontal alignment 	Nugent Textbook Chapter 4 Garber Textbook- Chapter 15	HW1 is due CA1 is assigned and due
Week 4	Horizontal Geometry <ul style="list-style-type: none"> - Safety consideration 	Nugent Textbook Chapter 4 Garber Textbook- Chapter 15	HW2 is assigned CA1 is assigned and due
Week 5	Vertical Geometry <ul style="list-style-type: none"> - Vertical alignment - Profiles 	Nugent Textbook Chapter 5 Garber Textbook- Chapter 15	HW2 is due HW3 is assigned
Week 6	Vertical Geometry <ul style="list-style-type: none"> - Sight distance criteria 	Nugent Textbook Chapter 5 Garber Textbook- Chapter 15	HW3 is due CA2 is assigned and due
Week 7	Midterm Exam	NA	NA
Week 8	Using and Editing Templates <ul style="list-style-type: none"> - From components 	Nugent Textbook Chapters 6 and 7	HW4 is assigned
Week 7	Using and Editing Templates <ul style="list-style-type: none"> - From scratch 	Nugent Textbook Chapters 6 and 7	HW4 is due
Week 8	Corridor Modeling <ul style="list-style-type: none"> - Dynamic sections 	Nugent Textbook Chapter 8	HW5 is assigned CA3 is assigned and due
Week 9	Corridor Modeling <ul style="list-style-type: none"> - Utilities 	Nugent Textbook Chapter 8	HW5 is due
Week 10	Creating Plan and Profile Sheets	Nugent Textbook Chapter 13	
Week 11	Creating Cross Sections <ul style="list-style-type: none"> - Report analysis 	Nugent Textbook Chapter 13	HW6 is assigned

Week 12	Quantities and Earthwork - 3D volumes Mass Haul Diagram	Instructor's handout	HW6 is due CA4 is assigned and due
Week 13	Quantities and Earthwork - 3D volumes - Advanced drainage capabilities	Garber Textbook- Chapter 16	HW7 is assigned CA5 is assigned and due
Week 14	Project estimates Cost analysis and report	Instructor's handout	HW8 is assigned
Week 15	Project estimates Advanced tips and tricks	Instructor's handout	HW8 is due
Week 16	Final exam (Refer to the final exam schedule in the USC <i>Schedule of Classes</i> at classes.usc.edu .)	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.