CEE 475: Highway Geometric Design (2025 Spring)

Course Objective:

Development and application of concepts of geometric design for rural and urban highways. Design controls and criteria, elements of design including sight distance, horizontal and vertical alignments, cross section elements, intersection elements, grade separation and interchanges. Computer applications using the MicroStation/OpenRoads software.

Instructors: Mike Mamlouk, GWC 134, mamlouk@asu.edu, 480-965-2892

Office hours: M, W 10:30-11:30 pm or by appointment

Paul Balch, Dibble Engineering, paul.balch@dibblecorp.com

Class Time & Place: Lecture: M, W 9:05 – 9:55, COOR 184

Computer Lab: F 9:05 – 11:00, HLMK 533

Prerequisite: CEE 372

Text: Roadway Design Guidelines, 2021 Edition with February 2022 Revisions, Chapter 1 and Chapters 100 – 500.

https://azdot.gov/sites/default/files/media/2022/02/2021-roadway-design-guidelines-feb-2022-revised.pdf

Reference: A Policy on Geometric Design of Highways and Streets," 7th Edition, AASHTO, Washington, DC, 2018.

(https://www.academia.edu/33524500/AASHTO_Green_Book_2011.PDFLinks to an external site. , 6th Edition, 2011)

Class Information and Notes: https://asu.instructure.com/courses/

Projects and Homework:

A small lab project will be assigned to learn the basics of the MicroStation program. A larger lab project will be assigned covering the design of a typical highway using the OpenRoads program.

Written homework problems will be assigned throughout the semester. Homework (preferably typed) will be submitted on Canvas.

Term Paper (CEE 576):

A term paper will be required from each graduate student registered for CEE 576.

Grading:

Homework	10%
Projects	30%
2 exams	35%
Final	25%

Grades will be curved.

Classroom Behavior:

Cell phones must be turned off during class to avoid causing distractions. Any violent or threatening conduct by an ASU student in this class will be reported to the ASU Police Department and the Office of the Dean of Students.

Academic Integrity:

All students in this class are subject to ASU's Academic Integrity Policy (available at http://provost.asu.edu/academicintegrity) and should acquaint themselves with its content and requirements, including a strict prohibition against plagiarism. All violations will be reported to the Dean's office, who maintain records of all offenses.

Disability Accommodations:

Suitable accommodation will be made for students having disabilities and students should notify the instructor as early as possible if they require same. Such students must be registered with the Disability Resource Center and provide documentation to that effect.

Sexual Discrimination:

Title IX is a federal law that provides that no person be excluded on the basis of sex from participation in, be denied benefits of, or be subjected to discrimination under any education program or activity. Both Title IX and university policy make clear that sexual violence and harassment based on sex is prohibited. An individual who believes they have been subjected to sexual violence or harassed on the basis of sex can seek support, including counseling and academic support, from the university. If you or someone you know has been harassed on the basis of sex or sexually assaulted, you can find information and resources at https://sexualviolenceprevention.asu.edu/faqs.

As a mandated reporter, I am obligated to report any information I become aware of regarding alleged acts of sexual discrimination, including sexual violence and dating

violence. ASU Counseling Services, https://eoss.asu.edu/counseling, is available if you wish discuss any concerns confidentially and privately.

Copyright

All course content and materials, including lectures are copyrighted materials and students may not share outside the class, upload to online websites not approved by the instructor, sell, or distribute course content or notes taken during the conduct of the course (see ACD 304–06, “Commercial Note Taking Services” and ABOR Policy 5-308 F.14 for more information).

You must refrain from uploading to any course shell, discussion board, or website used by the course instructor or other course forum, material that is not the student's original work, unless the students first comply with all applicable copyright laws; faculty members reserve the right to delete materials on the grounds of suspected copyright infringement.

Week of	*Topic*	*Assignment*
1/13	Introduction, highway function and classifications	Chapter 1
1/20	MLK holiday	
	Vehicle characteristics	Chapter 100
1/27	Driver performance and traffic characteristics	Chapter 100
2/3	Sight distance, horizontal alignment	Chapter 100
2/10	Horizontal alignment	Chapter 200
2/17	Horizontal alignment	Chapter 200
2/24	Horizontal alignment	Chapter 200
3/3	Vertical alignment	Chapter 200
	Exam No. 1 (W, 3/5)	
3/10	Spring Break	
3/17	Vertical alignment	Chapter 200
3/24	Cross section elements	Chapter 300
3/31	AASHTO Specifications	
	Local roads and streets	
	Collector roads and streets	
	Rural and urban arterials	
	Freeways	
4/7	At-grade intersections	Chapter 400
4/14	Islands, roundabouts	Chapter 400
	Exam No. 2 (W, 4/16)	
4/21	Grade separations and interchanges, lane balance, Auxiliary lanes	Chapter 500
4/28	Geometric improvements to reduce accidents	

Final Exam (Comprehensive), Wednesday, May 7, 7:30 - 9:20 AM

Computer Lab Schedule

Date	***Topic***	
1/17	*No lab*	
1/24	*No lab*	
1/31	Labs 1-3 Basics of MicroStation	
2/7	Labs 1-3 Basics of MicroStation	
2/14	Labs 4-5 Digital terrain model and contours	(Labs 1-3 Due)
2/21	Labs 4-5 Digital terrain model and contours	
2/28	Labs 6-7 Horizontal alignment	(Labs 4-5 Due)
3/7	*No lab*	
3/14	*No lab (spring break)*	
3/21	Labs 6-7 Horizontal alignment	
3/28	Labs 8-9 Vertical alignment	(Labs 6-7 Due)
4/4	Labs 8-9 Vertical alignment	
4/11	Lab 10 Creating Templates	(Labs 8-9 Due)
4/18	Labs 11-12 Modeling	
4/25	Labs 11-12 Modeling	(Labs 10-12 Due)
5/2	*No lab*	