

# CE 367G: Design & Evaluation of Ground-Based Transportation Systems

## Spring 2023 (unique #16445)

Lectures: Tu/Th 12:30 to 1:45 pm, in 3.402 ECJ  
Laboratory Section: Mondays 3:30-5:30 pm, in 2.218 ECJ

### I. Office Hours for Instructor, Dr. Kara Kockelman

Mondays 10:30am-noon & Tuesdays 3-4:30pm, in 6.904 ECJ  
& by phone: 512-471-0210 (office), email [kkockelm@mail.utexas.edu](mailto:kkockelm@mail.utexas.edu) for appointment

Note: PhD student Priyanka Paithankar ([Priyanka.paithankar@utexas.edu](mailto:Priyanka.paithankar@utexas.edu)) will serve as the course TA and lab instructor. Her office hours will be held at a time that works best for the group (& for her). She also can answer questions by email. Local professionals Robert Ramon (at JMT) & Allen Yu (at ATKINS) will be happy to help with OpenRoads instruction.

### II. Prerequisites

According to the College of Engineering Catalog, CE321, Transportation Systems, is a prerequisite for undergraduates intending to enroll in CE367G; the consent of the instructor may waive this requirement.

### III. Grading

For purposes of grading, the performance of students enrolled in CE367G will be assessed using the following scoring system:

Homework Assignments	45%
Class Participation	5%
First In-Class Exam	22%
Final Exam	28%

**IV. Homework Solutions & Academic Dishonesty:** The use (& sharing) of unauthorized sources of class materials (e.g., homeworks or exams via CourseHero & Cramster) is considered scholastic dishonesty, plagiarism and a violation of UT's Standard of Academic Integrity. Please see the University Honor Code at <http://registrar.utexas.edu/catalogs/gi09-10/ch01/index.html> and [http://deanofstudents.utexas.edu/sjs/acint\\_student.php](http://deanofstudents.utexas.edu/sjs/acint_student.php), and let me know if you see this happening. More academic honor details are provided below.

### V. Examinations\*

The two in-class exams are *tentatively* scheduled for the following times.

Midterm	Thursday, March 2 (tentative)
Final Exam	Friday, April 28, 3:30-5:30 pm (UT Austin's Final Exam Slot)

Make-up exams will *not* generally be given to any student. If a student is absent from a scheduled exam due to medical or other problems beyond her/his control and can plainly demonstrate this, the instructor can choose to give the student a completely different exam, additional assignments, and/or change the weighting of the student's various graded contributions.

### VI. Laboratory Sections

The laboratory sections are intended for additional depth in important technical areas, to hone abilities useful for analysis of multi-faceted projects. There will be demonstrations & some hands-on learning of computer-aided design (CAD) software and the MS Excel Solver tool in one or two of these lab times (using Bentley's OpenRoads assignments, with software access Guide here: [https://communities.bentley.com/communities/other\\_communities/be\\_careers\\_network\\_for\\_academia/b/news/posts/studentserver-guide](https://communities.bentley.com/communities/other_communities/be_careers_network_for_academia/b/news/posts/studentserver-guide)).

## VII. Course Objectives, Academic/Learning Goals

A number of courses in the Civil Engineering program curriculum have been designated as “design synthesis” courses.

To this end, upon completion of this course, students should have the following skills:

- The ability to identify existing or emerging deficiencies within a transportation system.
- The ability to generate, evaluate and select a preferred project alternative through technical analysis.
- The ability to justify analysis results and design choices through written and oral means.

*Note: This course carries the **Independent Inquiry** flag. Such courses are designed to engage students in the process of inquiry over the course of a semester, providing them the opportunity for independent investigation of a question, problem, or project.*

## VIII. Text/Reader and Course Notes

A hard copy of the Course Packet should be purchased for approx. \$30 (vs. \$220 new) via Jerome Kubala (512-497-6662; [jerome.kubala@gmail.com](mailto:jerome.kubala@gmail.com)). The Packet consists of selected pages from Garber and Hoel's (G&H's) *Traffic and Highway Engineering* (Fourth Edition, 2009), which thoughtfully presents many of the ideas present in AASHTO's “Green Book” – or *Policy on Geometric Design of Highways and Streets* (including all key tables for horizontal and vertical alignment designs). The Packet also contains a great deal of Green Book content & several sections of the *Highway Safety Manual* (2010). The Green Book and HSM 2010 with 2014 supplement (<https://compass.astm.org/document/?contentCode=AASHTO%7CAASHTO%20HSM-1%7Cen-US>) are also available online, via the UT library system. Both our **tests are open notes, open book**, so you will want to have hard copies of key tables with you at both exams.

Lecture slides are available online (on Canvas) for students to print (3 or 6 slides per page and double-sided is best). Other valuable reading may include additional content from the PET Guidebook and the Transportation Research Board's *Highway Capacity Manual* (HCM). Some reading assignments listed below are found on-line at the Victoria Transport Policy Institute (VTPI) <http://www.vtpi.org/tca/>.

## IX. Add/Drop Dates

From the 1st through the 12th class day, an undergraduate student can drop a course via the web and receive a refund, if eligible. From the 13th through the university's academic drop deadline, a student may Q drop a course with approval from the Dean, and departmental advisor.

## X. Evaluation Plan

UT's Course/Instructor Survey form will be used as the basic evaluation tool. All students are encouraged to submit written comments during this survey. Other formal assessment opportunities

may arise mid-semester; and students are strongly encouraged to provide feedback at any time during the course, in person, via other students or anonymously, to the TA and/or the instructor.

## **XI. Other**

1. The University of Texas at Austin provides, upon request, appropriate academic accommodations for qualified students with disabilities. For more information, contact the Division of Diversity and Community Engagement, Services for Students with Disabilities, 471-6259 (voice) or 410-6644 (video phone) or <http://ddce.utexas.edu/disability/>.

2. A student who misses classes or other required activities, including examinations, for the observance of a religious holy day should inform the instructor as far in advance of the absence as possible, so that arrangements can be made to complete an assignment within a reasonable time after the absence.

3. Students in this section of CE367G are encouraged and authorized to work on homework assignments together and prepare for exams together. However, all written work handed in by a student is considered to be his/her own work, prepared without *unauthorized* assistance. To ensure your actions never compromise your and our class's integrity, please visit <http://catalog.utexas.edu/general-information/appendices/appendix-c/student-discipline-and-conduct/>. Students who violate University rules on scholastic dishonesty (*e.g.*, anything which gives unfair academic advantage to a student) are subject to disciplinary penalties, including the possibility of failure in the course and/or dismissal from the University. Since such dishonesty harms the individual, all students, and the integrity of the University, policies on scholastic dishonesty will be strictly enforced. An "F" grade will be the recommended penalty in most cases of scholastic dishonesty. One should refer to the Student Judicial Services website at <http://catalog.utexas.edu/general-information/appendices/appendix-c/student-discipline-and-conduct/> to access the official University policies and procedures on scholastic dishonesty as well as further elaboration on what constitutes scholastic dishonesty.

4. *Math & statistics tutors* and other learning assistance can be obtained via the Learning Skills Center (Jester Center, 471-3614). See <https://ugs.utexas.edu/slc/support/one-on-one>.

**Sharing of Course Materials is Prohibited:** No materials used in this class, including, but not limited to, lecture hand-outs, videos, assessments (quizzes, exams, papers, homework assignments), in-class materials, review sheets, and additional problem sets, may be shared online or with anyone outside of the class unless you have my explicit, written permission. Unauthorized sharing of materials promotes cheating. It is a violation of the University's Student Honor Code and an act of academic dishonesty. We are well aware of the sites used for sharing materials, and any materials found online that are associated with you, or any suspected unauthorized sharing of materials, will be reported to Student Conduct and Academic Integrity in the Office of the Dean of Students. These reports can result in sanctions, including failure in the course.

**Class Recordings:** Class recordings are reserved only for students in this class for educational purposes and are protected under FERPA. The recordings should not be shared outside the instructor's courses in any form. Violation of this restriction by a student could lead to Student Misconduct proceedings.

## XI. Course Content & (Tentative) Outline of Topics and Order of Presentation

CE 367G covers various aspects of transportation relating to the design of ground-based transportation systems (emphasizing roadway and non-motorized travel). The course *objectives* are that students are able to design safe, cost-effective, and sustainable networks, are familiar with design standards, and are comfortable with various tools for project evaluation. Primary topics include physical design for safe and efficient transport to meet passenger and freight needs, multi-modal and multi-objective planning, crash prediction, cost considerations, environmental impacts, and operational analysis. A great variety of other topics apply as well. A tentative scheduling of the course topics is shown below.

Lesson # & TOPICS TO BE COVERED	Relevant Reading in G&H, AASHTO's Green Book (GB), & VTPI website
1 Introduction of Course	G&H Ch. 1 & 2: pp. 3-52
2 Methods for Evaluating Transp. Alternatives: Engineering Economics	G&H Ch. 13: 653-684
3 Anticipating Project Costs & Benefits	VTPI's Transport. Cost & Benefit Analysis: Ch 5.6 at <a href="http://www.vtpi.org/tca/">http://www.vtpi.org/tca/</a>
4 Sight Distance Calculations: Stopping, Passing and Intersection	G&H Ch. 3: pp. 88-94, & Ch. 7: pp. 301-320; GB: 3-1 to 3-18, 3-106 to 3-111, 9-28 to 9-54
5 Horizontal Alignment Design: Circular Curves & Superelevation	G&H Ch. 15: pp. 770-783; GB: 3-18 to 3-58
6 Design of Superelevation Development	G&H Ch. 15: pp. 783-787; GB: 3-59 to 3-84
7 Vertical Alignment Design	G&H Ch. 15: pp.756-770; GB: 3-149 to 3-164
<b>*** Midterm Exam *** (approx. timing)</b>	
8 Design of Roadway Cross Sections & Roadsides	G&H Ch. 5: pp.195-200, & Ch. 15: pp.745-754; GB: 4-1 to 4-36
9 Complete Streets, Context-Sensitive Design, and Pedestrian Facilities	G&H Ch. 5: pp.203-208; GB: 4-56 to 4-74 <u>ITE Journal Sept 2011 articles:</u> (1) Walkable Urban Thoroughfares & (2) Roundabouts as Context Sensitive Solns
10 Intersection Design	G&H Ch. 7: pp.265-322; GB: 9-55 to 9-114
11 Interchange Design	G&H: Ch. 8: pp.327-378; GB 10-1 to 10-62
12 Anticipating Crash Counts & Severity as a Function of Design Decisions	G&H Ch. 5: pp. 151-208, plus <u>Highway Safety Manual</u> pages in course reader
13 Key Traffic Variables for Evaluating System Level of Service	G&H Ch. 6: pp.213-258, & Ch. 9 & 10: pp. 381-528
14 Regulatory Controls Impacting Transportation Project Plans	G&H Ch. 11: pp. 551-586
<b>*** Final Exam *** Friday, April 28, 3:30-5:30 pm</b>	