

# CE 367 (#15280 & 15285): HIGHWAY ENGINEERING Spring 2009

Lecture: 2:00p-3:15p Tu/Th, Location: 1.204 ECJ  
Laboratory: Wed 5:00p-6:00p, Location: 3.402 ECJ

Related Course: Professional Ethics Seminar (with Dr. Gilbert) Wed 3:00p-5:00p, in ECJ 1.202

## I. Office Hours for Dr. Kara Kockelman

Mondays 2:00-4:00 pm & Tuesdays 3:15-5:00 pm, 6.904 ECJ  
Or, by appointment: 471-0210 (office phone number) & kcockelm@mail.utexas.edu

Note: Graduate student Renee Alsup (renee.alsup@gmail.com) will serve as (lab) TA, and Charlotte Whitehead will serve as grader for course assignments. Questions for them should be submitted in writing with assignments. Renee will be available weekly to assist students with lab projects, exam preparation and homework problems. She expects to hold her office hours from 3:30 to 5:30 pm on Mondays, in ECJ 6.706.

## II. Prerequisites

According to the College of Engineering Catalog, CE321, Transportation Systems, is a prerequisite for undergraduates intending to enroll in CE367; the consent of the instructor may waive this requirement.

## III. Add/Drop Dates

Adding and/or dropping a course (on ROSE or TEX) after the fourth day of the semester requires the approval of the Department Chairperson and usually the Dean. Dropping a course after the twelfth class day is quite difficult for undergraduate students and will not be approved except for extraordinary, non-academic reasons. Poor performance in the course is not an acceptable reason for dropping. Students are strongly urged to make changes in their course schedules the first four class days so that other students who need to add the course can be accommodated.

## IV. Evaluation Plan

The College of Engineering Course/Instructor Survey will be used as the basic evaluation tool. All students are encouraged to submit written comments during this survey.

## V. Grading

For purposes of grading, the performance of students enrolled in CE 367 will be assessed using the following scoring system:

Homeworks <sup>*</sup>	25% of score/grade
Lab Projects	20% (10% for regular labs & 10% for final project)
In-Class Midterm	22.5%
Final Exam	32.5%

<sup>\*</sup> Generally, there are 9 or 10 regular homeworks in this course, one or two of which are essay assignments. The instructor reserves the right to consider Class Participation & Quizzes in the evaluation of a student's performance. These two items may contribute up to 8% of a student's grade, falling uniformly across categories. Lab participation will count toward the Design Project's grading. Exam dates are discussed below.

## VI. Homework Assignments

Homework problems will be assigned weekly and must be handed in at the *beginning* of the period in which they are due. After this time, they will be considered late and given *no credit*. However, *all assigned problems must be completed* (within 3 weeks of their due date and at least one week before the final exam) or a student's participation score will be adversely impacted.

## VII. Laboratory Sections & Design Project

The laboratory sections are intended for instruction and hands-on learning of computer-aided design (CAD) software. The roadway-design software used is that favored by the state DOT (TxDOT): GEOPAK. This software runs through MicroStation (a common CAD package). All lab assignments are provided via the Web at

[http://www.cae.utexas.edu/prof/rioux/ce367\\_200901/GeometricDesignLab.htm](http://www.cae.utexas.edu/prof/rioux/ce367_200901/GeometricDesignLab.htm) (and these can be read while working on-line).

The instructor for the lab portion of this course is Dr. Thomas W. Rioux who taught this lab from 1993 through 2005 and can be reached at [rioux@mail.utexas.edu](mailto:rioux@mail.utexas.edu) (preferred) or 422-8682 (cell phone) with office hours for 1 hour after the lab and by appointment.

A number of courses in the civil engineering curriculum have been designated "design synthesis" courses. This is one of those courses, so your final project requires recognition of engineering standards of safety and quality, alongside various real-world constraints, including economic, environmental, social, political, ethical, and public health factors, constructability and sustainability.

The design project for this course involves the computer-aided geometric design and drafting of a highway interchange/ramp section. The design project is to be in teams of two and will constitute a significant component of the course. An oral presentation and a written report of the design project will be completed by each student team.

## VIII. Examinations<sup>\*</sup>

The in-class midterm is *tentatively* scheduled & the final exam is formally scheduled for the following dates:

Midterm<sup>\*</sup>      Thursday, March 5  
Final Exam<sup>\*\*</sup>   Wednesday, May 13

<sup>\*</sup> The instructor reserves the right to periodically administer, grade, and use in student evaluation "pop"/unannounced *quizzes*. Students should come to class prepared to contribute to each class's lecture and discussion by staying up-to-date with homeworks and reading.

<sup>\*\*</sup> If the majority of the students elect to make the final exam into a second in-class exam, given late in the semester, the instructor will seek to change this.

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.

## IX. Text and Reader/Notes

The Course Packet can be purchased for \$37 at IT Printing at 512 West MLK. The Packet consists of

selected pages from AASHTO's *A Policy on Geometric Design of Highways and Streets, 2001* (Fifth Edition, Copyright 2004, American Association of State Highway and Transportation Officials). This book is also called the "Green Book."

Lecture slides are available online (at [www.ce.utexas.edu/prof/kockelman/public\\_html/ce367lecture1\\_5.pdf](http://www.ce.utexas.edu/prof/kockelman/public_html/ce367lecture1_5.pdf), [ce367lecture6\\_10.html](http://www.ce.utexas.edu/prof/kockelman/public_html/ce367lecture6_10.html), [ce367lecture11\\_15](http://www.ce.utexas.edu/prof/kockelman/public_html/ce367lecture11_15.pdf), [ce367lecture16\\_20](http://www.ce.utexas.edu/prof/kockelman/public_html/ce367lecture16_20.pdf), & [ce367lecture21+.pdf](http://www.ce.utexas.edu/prof/kockelman/public_html/ce367lecture21+.pdf)) for students to print (double-sided is best, and in color). Chapters from the latest *Highway Capacity Manual* (HCM) may also be needed later in the course, depending on student end-of-semester topic suggestions, so appropriate HCM readings may be assembled in the form of a course packet for students to purchase from a local copier. Since the course textbook does not cover all subjects in great depth and does not include example problems, students may wish to consult other texts for further reading. A highly recommended text for design is Garber and Hoel's *Traffic and Highway Engineering* (any edition). In addition, various design manuals from state departments of transportation may prove very helpful; for example, Texas' Design Manual can be found at <http://manuals.dot.state.tx.us/dynaweb/>. For more information on traffic operations, students may wish to consult the complete *Highway Capacity Manual* (by TRB), Garber and Hoel's textbook, C. F. Daganzo's *Fundamentals of Transportation & Traffic Operations* (1997) and/or A.D. May's *Traffic Flow Fundamentals* (1990). For more information on signage, islands, work zones, or other traffic-control-device situations, students should consult a recent *Manual on Uniform Traffic Control Devices*.

## **X. Other Information**

1 U.T. Austin provides upon request appropriate academic adjustments for qualified students with disabilities. Any student with a documented disability (physical or cognitive) who requires academic accommodations should contact the Services for Students with Disabilities area of the Office of the Dean of Students at 471-6259 (or 471-4241, TDD) as soon as possible to request an official letter outlining authorized accommodations. The College of Engineering also has its own Director of Students with Disabilities, who can be reached at 471-4321.

2 According to *The General Information Catalog* "a student who is absent from a class or examination for the observance of a religious holy day may complete the work missed within a reasonable time after the absence, if *proper notice* of the planned absence has been given". The deadline for proper notification of such an absence is the fifteenth day of the semester.

3 Students in CE367 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://www.utexas.edu/depts/dos/sjs/academicintegrity2.html>. 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://www.utexas.edu/depts/dos/sjs/> to access the official University policies and procedures on scholastic dishonesty as well as further elaboration on what constitutes scholastic dishonesty.

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

CE 367 covers various aspects of transportation relating to the design of roadways. The course *objectives* are that students are able to design safe and efficient roadways, are familiar with roadway-design standards, and are comfortable with computer-aided highway design tools. Primary topics include driver behavior, vehicle response, roadway and interchange design, and roadway construction. A great variety of other topics apply as well. Given time constraints, students will be permitted to select final topics covered in class. A tentative scheduling of the course topics is shown below.

<b>Lesson # &amp; TOPICS TO BE COVERED</b>	<b>Relevant Reading</b>
	<i>Green Book 5<sup>th</sup> ed.</i>
1 Introduction & Overview of Course	-
2 Highway Functions & Design Vehicles	pp 1-46
3 Driver & Traffic Characteristics	46-74
4 Speed Criteria & Highway Flow	66-83
5 Sight Distances: Stopping, Passing, & Decision	109-128,224-229
6 Horizontal Alignment: Circular Curves & Superelev.	131-167
7a Slip, Roll & Banking	143-193
7b Superelevation Development	143-193
8 Compound Curves & Spirals	175-193
9 Vertical Alignment	265-280
10 Special Lanes	231-265
11 Project Plans & Design Sequence	280-288
12 Cross Sections: Lanes, Shoulders, Cross-Slopes, Pavements & Medians	305-319, 337-339
- Review for Midterm Exam	
- <b>Midterm Exam</b>	
** SPRING BREAK **	
13 Cross Sections: Barriers & Clear Roadsides	318-336
14 Design Project Overview	
15 Intersxns., Channelization, Left Turns, & Roundabouts	555-649
16 Sight Distances at Intersections	650-741
17 Interchange Types & Distinctions	743-807
18 Exit & Entrance Ramps & Ramp Terminals	823-867 & HCM Ch. 24
19 Designing Away Death: Crash Exposure, Frequency, Severity	
<b><i>Students' Choice of Lecture Topics...</i></b>	
- Lighting: Open Roadways & Tunnels	348-356
- Drainage: Curbs, Channels, & Culverts	319-329
- Freeway Level of Service (LOS) & Capacity Calcs.	84-88 & HCM Ch. 13 & 23
- Two-lane Highway & Sig. Intersection LOS	
- Weaving Segments LOS	
- Roadway Costs, Resid. Street Design, Parking Lots	
- Highway Continuity, Uniformity, & Lane Balance	807-823
- Earthwork Calculations	
- Designing for Pedestrians & Cyclists + ADA	96-100, 357-367, 396-398
- Right of Way Acquisition	
- Roadway Construction & Traffic Control Plans	
- Noise Impacts & Standards	
- Assorted Topics	
Lab Design Project Presentations	
May 13 <b>Final Exam</b> (if given after semester)	