CE 321: TRANSPORTATION SYSTEMS
12:30-2:00 Tu/Th, 5.416 ECJ (Kockelman)

I. Office Hours for Dr. Kara Kockelman
Mondays & Tuesdays, 2:00 - 4:00 pm, 6.904 ECJ
Or, by appointment: 471-0210 (office phone number) kkockelm@mail.utexas.edu

Note: For classes of 15 students or more, a student homework grader will be assigned. Questions for this grader should be submitted in writing with assignments (& clearly addressed to the reader). Also, please do let me know if an informal teaching assistant would be of use to you at any point in the semester; if several students are interested in such assistance, specific hours may be arranged.

II. Prerequisites
According to the College of Engineering Catalog, the following prerequisite must be satisfied before enrolling in CE321: CE 311S, Elementary Statistics for Civil Engineers.

III. Add/Drop Dates
From the 1st through the 4th class day, an undergraduate student can drop or add a course on ROSE or TEX. From the 5th through the 12th class day, a student can drop through ROSE or TEX; adds must be done in the department offering the course. For any drops beginning with the 13th class day, a student must initiate the drop process in the office of the Dean (ECJ 2.200). Departmental advisor and instructor approval may be required; poor course performance is insufficient reason for such approval.

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. Other formal assessment opportunities are likely to arise mid-semester; and students are strongly encouraged to provide feedback at any time during the course, in person or anonymously.

V. Grading
For purposes of grading, the performance of students enrolled in CE 321 will be assessed using the following scoring system:

In-class Exams 1 & 2	22.5% & 22.5% of score/grade
Homework	25%
Final Exam	30%

The instructor reserves the right to consider Class Participation & Quizzes** in the evaluation of a student's performance in the course. These two items may contribute up to 15% of a student's grade, falling within the category of Homework.

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). Students may discuss & work on homework problems with other CE321, Section 1, students, but all problems must be completed by the student him/herself;

no copying will be permitted.

The 5th floor conference room (ECJ 5.442) has been reserved from 2-4 pm every Monday for your use, for team-based studying and homework discussions. As soon as construction is done on the 6th floor, we can begin meeting in 6.706 ECJ. Please make use of this opportunity, and do call upon me during that time! (It corresponds to office hours.)

VII. Examinations
The in-class exams** are *tentatively* scheduled & the final exam is formally scheduled for the following dates:

In-class Exam 1:	Thursday, October 3
In-class Exam 2:	Thursday, November 7
Final Exam:	Wednesday, December 11, 7-10 pm

** 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 homework and reading.

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.

VIII. Text and Reader/Notes
The required textbook for this course is N.J. Garber & L.A. Hoel's *Traffic & Highway Engineering* (Third Edition, 2002, Brooks/Cole, ISBN 0-534-38743-8). Additional, required materials, including copies of PowerPoint slides used by the instructor, will be made available at Dobie Mall's *Speedway Copy & Printing* (478-3334) or the *University Co-op*.

Since the course textbook does not cover (in great depth) all subjects to be taught, students may wish to consult other texts for further reading. Recommended texts include: C. F. Daganzo's *Fundamentals of Transportation & Traffic Operations* (1997), C.S. Papacostas and P.D. Prevedouros' *Transportation Engineering and Planning*, *Third Edition* (2001), P.H. Wright's *Highway Engineering* (1995), E.K. Morlok's *Introduction to Transportation Engineering and Planning* (1978), and A.D. May's *Traffic Flow Fundamentals* (1990).

IX. Other Information
1.   The University of Texas at 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 as soon as possible to request an official letter outlining authorized accommodations. For more information, contact that Office, or TTY at 471-4641, or the College of Engineering Director of Students with Disabilities 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 this section of CE321 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.

4. *Tutoring* and other learning assistance can be obtained via the Learning Skills Center (Jester Center, 471-3614). For example, CE321 students may be interested in reviewing statistics and calculus, as well as preparing for the EIT.

X. Course Content & (Tentative) Outline of Topics and Dates of Presentation

CE 321 covers all aspects of transportation systems, including planning, economics, location, operations, design, construction, and safety of various types of transport systems. The course's three primary topics being geometric design, system operations, and transportation planning.

By the end of this course, students should be able to:
- design safe & efficient basic-roadway sections;
- predict operations along freeways, at intersections, and in congested systems;
- estimate the travel demand of a region's inhabitants across a basic network.

To attain these objectives, we will systematically proceed through a series of topics, each with specific objectives. A listing of the course topics (and related chapters for reading, beyond the Course Notes) is shown here.

TOPIC(S) TO BE COVERED (& Relevant Reading in G&H)

Lesson 1. Introduction to Transportation Systems (Chs. 1 & 2)

Roadway Design Topics:

Lesson 2. The Driver, the Vehicle, & the Road (Ch. 3)
Driver abilities, vehicle forces, & braking

Lesson 3. Centrifugal Force & Sight Distances (Ch. 3)
Minimum radii for avoiding slip & rollover,
Provision of sufficient braking & stopping sight distances

Lesson 4. Vertical Alignment (Ch. 16)
Vertical curve geometry; minimum vertical curve lengths

Lesson 5. Horizontal Alignment (Ch. 16)
Terminology; geometry; specification & stationing; sight obstruction computations

Lesson 6. Cross-section Elements & Earthwork (Chs. 16 & 15, in part)
Medians; staking cross-sections; cut & fill shapes; computing areas & volumes; balancing earthwork

Lesson 7. Pavements (** *Optional* **, Ch. 20 & 21, in part)
Construction, maintenance, deterioration, & design

Lesson 8: Highway Safety (Ch. 5)
Crash frequency as a function of design; crash exposure by driver & vehicle type

Lesson 9: REVIEW of Design – for First Exam

* First in-class Exam (Tentatively Scheduled for Thursday, October 3)

Operations Topics:
      Lesson 10: Traffic Flow Fundamentals (Ch. 6 & pp. 84-99)
            Trivariate relation; flow-density diagram
      Lesson 11: Shockwaves & Time-Space Diagrams (Ch. 6)
      Lesson 12: Freeway Capacity Analysis (Ch. 9)
            Free-flow speed estimation; flow conversion to ideal conditions; Level of service
      Lesson 13: REVIEW of Operations (to date)
      Lesson 14: Pre-Timed Intersection Signal Design (Ch. 8)
            Warrants for signal use; dilemma zones & yellow time computations; Webster's
            formula for cycle time; computation of green times & pedestrian clearance times
      Lesson 16: Intersection LOS Analysis (Ch. 8)
            Saturation flow computations; delay equations; LOS assessment
      Lesson 15: Corridor Analysis – Coordinated Timing (Course Notes only)
      Lesson 17: Input-Output Diagrams & Queuing Theory (pp. 204-210 + Course Notes)
            Arrival & departure curves; queue length & delay calculations; MM1 queuing
            equations
Review for Exam

* Second in-class Exam (Tentatively Scheduled for Thursday, November 7 or 14)

Transportation Planning Topics:
      Lesson 18: Introduction to Transportation Planning & Demand Modeling (Chs. 11 & 12)
      Lesson 19: Planning Tools + Trip Generation (Chs. 11 & 12)
            Probabilistic distributions; regression analysis; trip-generation forecasting
      Lesson 20: Planning Models: OLS vs. Logit vs. Gravity Specifications (Ch. 12)
            Trip distribution; cross-classification
      Lesson 21: 4-Step Demand Models & Trip Assignment
            User equilibrium; shortest-path search algorithm; route assignment methods;
            congestion feedbacks
      Lesson 22: Additional Planning Tools: Software, Economics, & Simulation
      Lesson 23: Odds & Ends – Transportation Software & Statistics…

Review for Final Exam (CE321 Olympics! ☺)

* Final Exam (Wednesday, December 11, 7-10 pm)

XI. Transportation Topics Beyond CE 321...
U.T. Austin offers a wide array of excellent transportation courses. So that they may take many of CE 321's topics into greater depth, the instructor recommends that students consider the following courses:

Undergraduate Courses:
CE 366 M   Modern Pavement Materials
CE 367 T   Traffic Engineering
CE 367   Highway Engineering
CE 376   Airport Design

Graduate Courses:
CE 391 F   Advanced Theory of Traffic Flow
CE 391 H   Urban Transportation Planning
CE 391 J   Transp. Planning: Methodology & Techniques
CE 391 L   Advanced Traffic Engineering
CE 391 M   Advanced Geometric Design
CE 391 N   Engineering Systems Evaluation/Decision Making
CE 391 P   1-Theory & Behavior of Pavements
CE 391 T   Contemporary Transp. Issues
CE 391 V   Infrastructure Management Principles
CE 392T   Transport Economics
CE 397   Transport Data Acquisition & Analysis
CE 397   Modern Pavement Materials
CE 397   Public Transportation Engineering
CE 397   Intelligent Transp. Systems Seminar
CE 397   Intermodal Transp. Systems
--   Neighborhood Transp. Planning
CE 398 M   Transportation System Planning

Courses in other Departments:
ME 390 R   Statistical Methods
ME 390 R   Applied Stochastic Processes
EE 380 N   Optimization in Engineering Systems
EE 380 N   Stochastic Networks
ECO 380 M   Regional Economics
ECO 380 M   Urban Economics
ECO 392 M   Econometrics