CE 469 / 569 TRAVEL DEMAND MODELING
Spring 2006 Course Syllabus

Catalog Description:	Detailed investigation of methods to model travel demand, covering data collection and analysis, model development, and forecasting applications. Graduate-level requirements include a research paper or project. 3 units. Prerequisites: CE 363.
Course Objectives:	This course will provide students with an understanding of the basic principles of travel demand modeling. The student should gain skill in the collection and analysis of travel demand data, and should apply these methods to estimating and to forecasting travel demand. The student should understand current travel demand modeling techniques and be able to apply these to practical modeling scenarios. The student should also use existing computer tools to forecast travel demand among a range of planning conditions.
Instructor:	Dr. Mark Hickman Civil Engineering Building, Room 214B Phone: 626-9420, E-mail: mhickman@engr.arizona.edu Office hours: Tuesday and Thursday 10 am - 12 pm; other times by appointment.
Class Hours:	Tuesday and Thursday 2:00–3:15 pm, Harvill 318
Class Website:	http://www.u.arizona.edu/~mhickman/ce469.html
Readings:	A reader is available from EES Copy Center in Harvill 137. Other readings are available on the Internet, as listed in the Course Outline.
Grading:	35% for homework and computer projects, 20% each for 2 in-class exams, and 25% for the comprehensive final exam. Graduate student projects are worth 20% of the total grade, with proportional adjustments in the percentages for homework and exams. Final semester grades are based on: A = above 90%; B = 80 to 89%; C = 70 to 79%; D = 60 to 69%; E = below 60%.
Homework:	There will be approximately 10 homework assignments, each worth 20 points toward the total homework grade. Homework that is late will have the following penalties: up to 1 class late: 5 points; up to 1 week late: 10 points; more than 1 week late: no credit. Working on homework in groups of two is permitted. However, each student should submit homework prepared by his/her own hand. This means that the problem description and any steps taken to solve the problem must be generated by each student individually. In the case where computer work is completed in a group, the group should submit only one solution, with both group members' names. Copying another person's work, *without attribution*, *including copying of any part or the whole of computer files or material from the Internet*, is considered plagiarism. It will be prosecuted as a violation of the University of Arizona Student Code of Conduct, in accordance with the Code of Academic Integrity. This code is published on-line at http://dos.web.arizona.edu/uapolicies/. It is the student's responsibility to be familiar with these codes.
Software:	We will be using the Cube™ software in this class. The software will be available on all computers in the transportation computer lab in Civil Engineering 214. Use of the software for instructional purposes is free, but the license expires at the end of the semester. If desired, students may borrow a CD from the instructor to install the software on their own computer.
Graduate Students:	Graduate students must complete an additional project or research paper during the semester. The project or research topic should be chosen in consultation with the instructor. Monthly 1-page progress reports should be submitted to the instructor during the semester. Final reports are due by Friday May 5, 2006.

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Course Outline

1. The Scope and Context of Travel Demand Modeling

Readings:

Robert Johnston, "The Urban Transportation Planning Process," Chapter 5 (pp. 115-140) of Susan Hanson and Genevieve Giuliano (eds.), *The Geography of Urban Transportation*, 3rd Edition. New York: The Guilford Press, 2004.

Thomas Domencich and Daniel McFadden, "The Scope and Objectives of Urban Travel Demand Analysis," Chapter 1 (pp. 1-15) of *Urban Travel Demand: A Behavioral Analysis*, New York: North-Holland Publishing Company, 1975.

Marvin Manheim, "The Demand for Transportation," Chapter 2 (pp. 58-90) of *Fundamentals of Transportation Systems Analysis; Volume 1: Basic Concepts*. Cambridge, MA: MIT Press, 1979.

Michael Meyer and Eric Miller, "Demand Analysis," Chapter 5 (pp. 247-331) of *Urban Transportation Planning*, 2nd Edition. New York: McGraw-Hill, 2001.

2. Travel Data

Readings:

Herbert Levinson and Robert Jurasin, "Transportation Planning Studies," Chapter 5 (pp. 95-173) of *Transportation Planning Handbook*, 2nd Edition. Washington, DC: Institute of Transportation Engineers (ITE), 1999.

Barton-Aschman Associates, Inc., and Cambridge Systematics, Inc., *Model Validation and Reasonableness Checking*, Report for the Travel Model Improvement Program (TMIP), Federal Highway Administration, February 1997. Available at http://tmip.fhwa.dot.gov/clearinghouse/docs/mvrcm/

Optional: Cambridge Systematics, Inc., *Travel Survey Manual*. Publication No. FHWA-PL-96-029, prepared for the U.S. Department of Transportation and the U.S. Environmental Protection Agency, July 1996. Available at http://ntl.bts.gov/lib/4000/4500/4529/1392.pdf

3. Land Use Modeling

Readings:

Frank Southworth, *A Technical Review of Urban Land Use - Transportation Models as Tools for Evaluating Vehicle Travel Reduction Strategies*, Report No. ORNL-6881, 1995. Available at http://cta.ornl.gov/cta/Publications/pdf/ORNL-6881.pdf

Pima Association of Governments, "Land Use Model Peer Exchange: Problem Statement," Published report, March 2003. Available at http://www.pagnet.org/population/LUModelNeeds.pdf

Exam 1 (in class), tentatively February 23, 2006

4. Trip Generation and Trip Distribution

Readings:

Eric Sheppard, "Modeling and Predicting Aggregate Flows," Chapter 5 (pp. 100-128) of Susan Hanson (ed), *The Geography of Urban Transportation*, 2nd Edition. New York: The Guilford Press, 1995.

Juan de Dios Ortúzar and Luis Willumsen, "Trip Distribution Modeling," Chapter 5 (pp. 163-198) of *Modelling Transport*, 3rd Edition. New York: John Wiley & Sons, 2001.

5. Discrete Choice and Mode Split

Readings:

Thomas Domencich and Daniel McFadden, "A Theory of Individual Travel Demand," Chapter 3 (pp. 33-46) of *Urban Travel Demand: A Behavioral Analysis*, New York: North-Holland Publishing Company, 1975.

Moshe Ben-Akiva and Steven Lerman, "Multinomial Choice," Chapter 5 (pp. 100-130) of *Discrete Choice Analysis: Theory and Application to Travel Demand*. Cambridge, MA: MIT Press, 1985.

6. Network Assignment

Readings:

David Boyce, "Auto Route Choice Principles," Chapter 2 (pp. 20-42) of Urban Travel Forecasting Course Notes, 2005.

Yosef Sheffi, "Solving for User Equilibrium," Chapter 5 (pp. 111-135) of *Urban Transportation Networks: Equilibrium Analysis with Mathematical Programming Methods*. Englewood Cliffs, NJ: Prentice-Hall, 1985.

Heinz Spiess and Michael Florian, "Optimal Strategies: A New Assignment Model for Transit Networks," *Transportation Research – Part B*, Vol. 23B, No. 2, pp. 83-102, 1989.

Exam 2 (in class), tentatively April 11, 2006

7. Activity Modeling

Readings:

John Bowman and Moshe Ben-Akiva, "Activity-Based Travel Forecasting," Working Paper for the Travel Model Improvement Program (TMIP), 1997. Available at http://tmip.fhwa.dot.gov/clearinghouse/docs/abtf/bowman.pdf

Chandra Bhat and Frank Koppelman, "Activity-Based Modeling of Travel Demand," Chapter 3 (pp. 39-65) of Randolph Hall (ed.), *Handbook of Transportation Science*, 2nd Edition. Boston: Kluwer Academic Publishers, 2003.

Travel Model Improvement Program (TMIP), *Chapter 1: TRANSIMS Overview*. 2005. Available at: http://tmip.fhwa.dot.gov/transims/transims_fundamentals/ch1.pdf

Final Exam: May 9, 2-4 pm