

## **PLAN 739: Transportation Planning Models**

Spring 2015

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Office Hours: Thursday 3:00-4:00 (drop-in or email me)

Co-Instructor: Leta Huntsinger, PE, PhD  
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Course Meetings: Thursday 5:00-6:30pm, New East 201 (Computer Lab)

### **Course Description**

This course in transportation planning provides a detailed introduction to the topic of travel demand modeling and the TransCAD modeling software. Travel demand models are the primary tool used to assess traffic conditions in the future and identify how proposed projects will impact future conditions. This step is an essential part of all long-range transportation plans and may also be used in small-scale planning efforts.

At the end of this course you will:

- Understand the current state of practice and art in transportation modeling,
- Understand critical assumptions of the models and how these assumptions influence model predictions,
- Be familiar with and able to use TransCAD software, and
- Understand alternate approaches to model building.

This course will be useful to students interested in transportation planning broadly. A small number of students may go on to use travel demand models as professional practitioners. A larger number of students will likely find the course helps them to review the output of travel demand models in their work as advocates, consultants, or governmental planners. This course will assist you in becoming sophisticated consumers of this information.

### **Course Requirements:**

**Projects:** The major requirement for this course will be a final project that requires students to synthesize course material and techniques. The final project will be supplemented with smaller weekly assignments.

**Attendance:** Participation in the class and effective collaboration with your classmates is essential in this course. To facilitate a collegial learning environment and provide opportunities for hands-on learning of the software, attendance is mandatory.

### Grading

Assignments	Due (dates subject to change)	Points
1. Weekly Assignments	TBA	25
2. Final Project Presentation & Report	Presentation (4/23), Report (TBA)	60
3. Attendance/Participation		15

### Late Assignments

Any assignments turned in late will incur a penalty of a half-grade (letter graded assignments) or half the standard deviation (numeric graded assignments). For example if a paper is a day late, the grade would change from a B to a B-. If the paper were two days late, the grade would change from a B to a C+.

### Readings

Readings for each session are detailed in the remainder of the syllabus. Many of the readings are drawn from the following texts:

- [MG] Parsons Brinckerhoff, Inc. Small Area Travel Demand Model Guidelines. 2008. [Sakai]
- Travel Demand Forecasting: Parameters and Techniques. NCHRP Report 716. [http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp\\_rpt\\_716.pdf](http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_716.pdf) [Sakai]
- [MP] Travel Demand Modeling Procedures Manual: CE701 & PLAN739. 2012. [Sakai]

### Honor Code

The UNC Honor Code states: "It shall be the responsibility of every student at The University of North Carolina at Chapel Hill to obey and to support the enforcement of the honor code, which prohibits lying, cheating, or stealing when these actions involve academic processes or University, student or academic personnel acting in an official capacity."

This standard does not preclude discussions of assignments with other students. However, I expect that each person turns in their own work. You must also provide citations for any ideas that are not your own.

## Course Schedule

Date	Topic	Presenter
8-Jan	Role of travel demand modeling in transportation planning	NM
15-Jan	TransCAD basics, Networks and paths (lab)	LH
22-Jan	Trip Generation & Trip Distribution	NM
29-Jan	Trip Generation & Trip Distribution (lab)	LH
5-Feb	Mode split	NM
12-Feb	External travel & Commercial vehicles; Lab (Mode split, external travel, commercial vehicles)	LH
19-Feb	Time of Day and Highway Assignment (lab)	LH
26-Feb	Model calibration and validation; Sensitivity testing	LH
5-Mar	Scenario building (lab)	LH
12-Mar	Spring break	
19-Mar	Evaluating project priorities	Guest lecture
26-Mar	Project work time (lab)	LH/NM
2-Apr	Future of travel demand modeling; Project work time (lab)	LH/NM
9-Apr	Project work time (lab)	NM
16-Apr	Project work time (lab)	NM
23-Apr	Final presentations	LH/NM
TBA	Final report due	

## Readings

\*\* Indicates required reading.

### Role of Travel Demand Modeling in Transportation Planning

\*\*Johnston. *Geography of Urban Transportation*, Ch. 5

\*\*Beimborn, Kennedy, and Schaefer. Inside the Black Box: Making Transportation Models Work for Livable communities.

\*\*Ortuzar & Willumsen, *Modeling Transport*, Ch. 1

Bhat, C. and F. Koppelman. Activity Based Modeling of Travel Demand, Chapter 3 in ??  
[http://orfe.princeton.edu/~alaink/NJ\\_aTaxiOrf467F12/Papers/lit%20review/TSHANDBK.pdf](http://orfe.princeton.edu/~alaink/NJ_aTaxiOrf467F12/Papers/lit%20review/TSHANDBK.pdf).

Meyer and Miller. Chapter 5 Transportation Demand Analysis.  
<http://mtsplan.com/services.html>

Metropolitan Travel Forecasting: Current Practice and Future Direction, Transportation Research Board Special Report 288, 2007, <http://onlinepubs.trb.org/onlinepubs/sr/sr288.pdf>, Ch. 1 & 2

### TransCAD Basics; Networks and Paths

MP 1,2

### **Trip Generation & Trip Distribution**

\*\*Meyer, Michael. 2001. *Urban Transportation Planning: a Decision Oriented Approach 2<sup>nd</sup> Edition*, Ch. 5, especially Sections 5.4 and 5.5, pp. 270-303.

\*\*MG 4, 5

Ortuzar & Willumsen, *Modeling Transport*, Ch. 4 & 5

Kanafani, Adib K. (1983) *Transportation Demand Analysis*, Chapter 7, pp. 189-217. McGraw-Hill, New York.

Stopher, Peter R and Arnim H. Meyburg. (1975) *Urban Transportation Modeling and Planning*, Chapter 8, 10 Lexington Books, Lexington, MA.

Bhatta, B. 2011. Are intrazonal trips ignorable? *Transport Policy* 18(1).

### **Trip Generation & Trip Distribution [Lab]**

MP 3-6

### **Mode Split**

\*\*McFadden, Daniel. 2002. "The Path to Discrete-Choice Models." Access No. 20, 2-7.

\*\*Meyer, Michael. 2001. *Urban Transportation Planning: a Decision Oriented Approach 2<sup>nd</sup> Edition*, Ch. 5

Ortuzar & Willumsen, *Modeling Transport* Ch. 6-11

McFadden Nobel Lecture

[http://www.nobelprize.org/nobel\\_prizes/economics/laureates/2000/mcfadden-lecture.pdf](http://www.nobelprize.org/nobel_prizes/economics/laureates/2000/mcfadden-lecture.pdf)

Walker, Joan L. 2011. Beyond Rationality in Travel Demand Models. Access 39.

[http://www.uctc.net/access/39/access39\\_demand\\_models.pdf](http://www.uctc.net/access/39/access39_demand_models.pdf)

### **External Travel & Commercial Vehicles**

MG 8,9

### **Time of Day & Highway Assignment**

MG 10,11

MP 7,8

## **Model Calibration & Validation**

MG 12

MP 9

Travel Model Validation and Reasonability Checking Manual Second Edition, September 24, 2010, FHWA-HEP-10-042, <http://tmip.fhwa.dot.gov/resources/clearinghouse/1397>, Ch. 1

## **Sensitivity Testing**

Travel Model Validation and Reasonability Checking Manual Second Edition, September 24, 2010, FHWA-HEP-10-042, <http://tmip.fhwa.dot.gov/resources/clearinghouse/1397>, Ch. 2

## **Scenario Building**

MG 13

MP 10

## **Evaluating Project Priorities**

TBA

## **Future of Travel Demand Modeling**

\*\*Transportation Research Board. 2007. "Shortcoming of Current Forecasting Processes," Special Report 288: Metropolitan Travel Forecasting: Current Practice and Future Direction, National Research Council, pp. 65-89.

\*\*Hartgen, D. 2013. Hubris or humility? Accuracy issues for the next 50 years of travel demand modeling. *Transportation* 40(6).

Flyvbjerg, Bent, Mette Skamris Holm, and Søren L. Buhl. 2005. How (In)accurate Are Demand Forecasts in Public Works Projects? The Case of Transportation. *Journal of the American Planning Association*. 71(2): 131-146.

The Accuracy of Transit System Ridership Forecasts and Capital Cost Estimates  
[http://www.trforum.org/forum/downloads/2009\\_13\\_RidershipForecasts\\_paper.pdf](http://www.trforum.org/forum/downloads/2009_13_RidershipForecasts_paper.pdf)

Bartholomew and Ewing. Integrated Transportation Scenario Planning. Summary Report  
[http://faculty.arch.utah.edu/bartholomew/Integrated\\_Transp\\_Scenario\\_Planning.html](http://faculty.arch.utah.edu/bartholomew/Integrated_Transp_Scenario_Planning.html)

Transportation Research Board. 2007. "Current State of the Practice," Special Report 288: Metropolitan Travel Forecasting: Current Practice and Future Direction, National Research Council, pp. 46-64.

Hatzopoulou & Miller. Transport policy evaluation in metropolitan areas: The role of modeling in decision-making. *Transportation Research Part A* 43(4): 323

Mackie, Peter and John Preston (1998). Twenty-One Sources of Error and Bias in Transport Project Appraisal. *Transport Policy* 5:1-7.

Lee. 1973. "Requiem for Large Scale Models." *Journal of the American Institute of Planners* 39(3)

Wachs. 1985. "Ethical Dilemmas in Forecasting for public Policy in Ethics in Planning, Martin Wachs, Editor. New Brunswick, NJ: Center for Urban Policy Research, pp. 246-258.

Four Perspectives on Ethics. 1989. *Journal of the American Planning Association* 55(4): 474-483 (especially Wachs p. 476.)

Dewar and Wachs. 2006. Transportation planning, climate change, and decision making under uncertainty. <http://onlinepubs.trb.org/onlinepubs/sr/sr290DewarWachs.pdf>

Madanat et al report on CA High Speed Rail

<http://www.its.berkeley.edu/publications/UCB/2010/RR/UCB-ITS-RR-2010-1.pdf>

Rhodes, Sarah. 2012. "Ride Then Decide." *Planning* December 2012.