

**Civil and Environmental Engineering 480-1 – Travel Demand Analysis and Forecasting**

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Credits: 1  
Room: M177 (lectures) or MG47 (labs), see schedule  
Time: MW 2:00–3:50  
Instructor's Office: Tech, Room A335  
Office Hours: M 4:00 – 5:00 or by appointment  
E-mail: a-stathopoulos@northwestern.edu

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**Course Description**

This course will provide an introduction to the statistical, econometric, and marketing research techniques used to study and forecast travel demand. The course will provide an introduction to the theory and practical application including instruction and empirical practice in model formulation, estimation and use of models in travel prediction. The course will also make an introduction to the statistical programming languages R and Biogeme, training students in building models of transportation demand. Practical problems are assigned to provide experience in handling real data, model estimation and model interpretation.

**Course Objectives**

- Develop an understanding of the travel demand modeling process.
- Develop the ability to use statistical analysis (including data exploration, hypothesis testing, etc.) to develop disaggregate models of individuals' travel choices.
- Become familiar with relevant software for statistical analysis and demand modeling.
- Become familiar with different model specifications, assumptions and implications while becoming experienced in both building and interpreting different structures.

**Course Format**

Classes are combination of lectures, discussions and laboratory work. Students are expected to read assigned texts before class and to participate in class discussions. Homework assignments will be given and analysis of these assignments will be the basis for some class discussion during the class immediately following their due date, so it is essential to complete assignments **on time**.

## Course Schedule

Class will normally meet on Mondays (in M177) and Wednesdays (MG47).<sup>1</sup> Office hours and class will be canceled on Monday, January 11 and Wednesday, January 13, to allow for participation in the TRB conference. To make up for the class sessions missed on account of TRB and MLK day, class will meet on two Fridays to be defined.

## Texts & Books

The overall text-book of the course will be:

- Ortúzar, Juan de Dios, and Luis G. Willumsen (2011) *Modelling Transport*, 4th Edition. (there is also a Kindle Edition Amazon, that you can also read on most tablets and computers).

Readings will be drawn further from different sources which will be made available online:

- Train, Kenneth (2009) *Discrete Choice Methods with Simulation*. Cambridge University Press <http://elsa.berkeley.edu/books/choice2.html>
- T. Domencich and D. McFadden, *Urban Travel Demand: A Behavioral Analysis*, North-Holland, New York, 1975. An online version, of possibly poor quality, is available from McFadden's site at UC Berkeley.

plus distributed notes and supplemental readings posted on Canvas or e-mailed to you. Assigned readings for particular classes will be announced in advance, either in class or in the announcements section on Canvas. Students should check Canvas regularly to get updates and class notes as they become available.

## Evaluation

The grade is based on a series of assignments of various nature, both individual and group homework assignments, class presentation, participation and written exams.

For individual homework assignments students may collaborate but need to prepare and present results and interpretations independently. For group homework assignments a single collective report is handed in and students choose their preferred method to collaborate. Assignments will be handed in to Canvas not emailed to facilitate the administration. The grade will consist of the weighted average of 6 components, namely;

- Individual homework assignment - report (15%)
- Group homework assignment I - report (15%)

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<sup>1</sup>Per university policy, the first class meeting will be on Monday, January 4. There will be no class during MLK day on Monday, January 18.

- Written midterm (20%)
- Group homework assignment II - report and oral presentation (20%)
- Written final (20%)
- Class participation (10%)

Late assignments will be penalized by a full letter grade per class late; an 'A' would become a 'B' after one class period, a 'C' after two class periods. Analysis assignments more than two classes late will not be accepted. However, if you have a serious conflict with another class<sup>2</sup>, software problems, or some other personal issues, deadlines can be extended when a request for such an extension is made *before* the due date. Also, keep in mind that given the focus on assignments in this class, they are generally going to be more extensive and rigorous than problem sets in other classes. High quality and thoughtful work is expected; leaving assignments to the last few hours before the deadline will likely not yield good results. The class participation section of the grade does not measure attendance in class, but instead it reflects the student's understanding of the subject matter, as reflected through insightful questions and discussion in class.<sup>3</sup> The grading scheme used is found in figure

## Office Hours

Office hours<sup>4</sup> are held on each Monday from 4:00 – 5:00pm. Most questions arise when using software to estimate models for homework assignments, and not on a regular schedule. As such, it is usually quickest to communicate questions and resolve issues via e-mail to me and to our programming TA and/or the class via the canvas discussion board. Additionally, students should feel welcome to set up an appointment with me, by emailing me at a-stathopoulos@northwestern.edu . E-mail responses can be expected within 24 hours, but questions about homework will not be answered if they are asked 24 hours or less before due date of the homework.

## Acknowledgments

This course, including notes, homework assignments, and data are adapted from those used for this class in prior years by Frank S. Koppelman, and for the last few years by Jeffrey Newman and Andreas Frey. I am grateful to them for letting me use their material in developing this course. The use of homework or example data beyond this course without permission is prohibited. Any students desiring to use data for publication purposes must check with the instructor to ensure appropriate permissions to use the data is obtained.

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<sup>2</sup>That fact another professor has assigned a homework assignment also due on the same date is not a serious conflict if the due date is still more than a week away.

<sup>3</sup>Although regular attendance is required to achieve this goal, attendance alone without active participation in class discussions will not result in a stellar grade.

<sup>4</sup>My office is in Tech A335

Figure 1: Grading scheme

**Grading Scale (% to letter grades)**  
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Percentage	Letter grades
93 -100	A
90 -92.9	A-
86 -89.9	B+
83 -85.9	B
80 -82.9	B-
76 -79.9	C+
73 -75.9	C
70 -72.9	C-
66 -69.9	D+
63 -65.9	D
60 -62.9	D-
0 -59.9	F