

**CE 397 – Linear Regression and Discrete Choice Methods**

**Fall 2015: Tuesdays and Thursdays, 3:30-5:00pm**

**Course Description**

The course provides instruction in econometric model estimation methods and use of behavioral models in service design, marketing and prediction. Practical problems in the context of transportation planning are assigned to provide familiarity with models used and experience in data handling and estimation.

**Course Content**

Methods and statistics of model estimation with emphasis on linear regression and maximum-likelihood estimation; sampling theory; hypothesis testing; interpretation of linear regression results; individual choice theory; binary choice models; unordered multinomial and multi-dimensional choice models; and aggregate prediction with choice models.

**Pre-requisites**

Familiarity with matrix algebra, statistical estimation and hypothesis testing, and basic differential calculus.

**Reading**

There is no text for the course. Students are required to purchase a course packet available at a local copy shop.

**Format**

Classes will be a combination of lecture and discussion. Students are expected to participate actively in class discussions. Homework assignments will be given, and analysis of these assignments will be the basis for some class discussion.

**Meeting Time and Location:** 3:30-5:00 p.m., Tuesdays and Thursdays in ECJ 7.202.

**Office Hours:** 2:00-3:00 p.m., Mondays in ECJ 6.810.

**Grading**

There will be **no exams** in this course. Grades will be based on homework assignments (85%), and class participation (15%). Students are expected to work independently on the homework assignments. Homework assignments will be due at the beginning of the class period on the date specified. No assignments will be accepted after the due date, except in very exceptional circumstances.

## **Web Site**

The web site for the course is <http://canvas.utexas.edu/> (Canvas). Once you get to this site, log in with your UT EID and password and select CE397 from the list of courses. The web site will include the main text, course contents, course calendar, data sets to be used in the assignments, additional datasets that may be used in projects, the SPSS and BIOGEME softwares, and several miscellaneous notes/links.

## **Course Calendar**

See “Calendar of Course Events” at the web site. Note that an additional class period will be held on September 4, September 14, September 21, October 5, October 16, October 19, November 2, and November 6. No classes will be held on October 1, October 13, November 3, November 5, November 19, November 24, and December 3. The front-end “loading” of the course is being done for two reasons. First, much background material will need to be covered in the beginning and additional classes early on will get us over this background “hump” early in the semester. Second, it will ensure a more uniformly-spaced distribution of the assignments.

## **Student Evaluation of Teaching**

Students will evaluate teaching in the course on December 1<sup>st</sup> using the approved UT Course/Instructor evaluation forms. The first 15-20 minutes of this class period will be reserved for the evaluation.

## **Other General Information**

Letter grades are used to record the instructor’s evaluation of students’ performance in a course. The following grades are used: A, A–, B+, B, B–, C+, C, C–, D+, D, D–, and F. To receive credit for a course, an undergraduate student must earn a grade of at least D–. To include a course in the Program of Work for a graduate degree, a graduate student must earn a grade of at least C.

**School of Engineering Drop Policy:** From the 1st through the 4th class day, graduate students can drop a course via the web and receive a refund. During the 5th through 12th class day, graduate students must initiate drops in the department that offers the course and receive a refund. After the 12th class day, no refund is given. No class can be added after the 12th class day. From the 13th through the 20th class day, an automatic Q is assigned with approval from the Graduate Advisor and the Graduate Dean. From the 21st class day through the last class day, graduate students can drop a class with permission from the instructor, Graduate Advisor, and the Graduate Dean. Students with 20-hr/week GRA/TA appointment or a fellowship may not drop below 9 hours.

**Students with Disabilities:** The University of Texas at Austin provides, upon request, appropriate academic accommodations for qualified students with disabilities. For more information, contact the Division of Diversity and Community Engagement, Services for Students with Disabilities, 512-471-6259 or <http://www.utexas.edu/diversity/ddce/ssd>.

**Web-Based Class Sites:** Web-based, password-protected class sites will be associated with all academic courses taught at the University. Syllabi, handouts, assignments and other resources

are types of information that may be available within these sites. Site activities could include exchanging e-mail, engaging in class discussions and chats, and exchanging files. In addition, electronic class rosters will be a component of the sites. Students who do not want their names included in these electronic class rosters must restrict their directory information in the Office of the Registrar, Main Building, Room 1. For information on restricting directory information, see the General Information Catalog: <http://catalog.utexas.edu/general-information/the-university/>.

Academic Integrity: Students who violate University rules on scholastic dishonesty 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. For further information, visit the Student Judicial Services web site <http://deanofstudents.utexas.edu/sjs/>, and the General Information Catalog: <http://catalog.utexas.edu/general-information/the-university/>.

**Anticipated Homework Assignments (with expected dates of distribution, submission and return)**

**1. Demand-Supply Equilibration and Urban Transportation Modeling System (UTMS)**

Distribution: Sept. 10                      Submission: Sept. 21                      Return: Sept. 29

**2. SPSS Familiarization and Data Exploration**

Distribution: Sept. 21                      Submission: Oct. 1                      Return: Oct. 6

**3. Trip Generation: Basic Issues and Market Segmentation**

Distribution: Oct. 6                      Submission: Oct. 15                      Return: Oct. 19

**4. BIOGEME Familiarization and Binary Choice Models**

Distribution: Oct. 27                      Submission: Nov. 6                      Return: Nov. 10

**5. Multinomial Mode Choice Models**

Distribution: Nov. 10                      Submission: Nov. 24                      Return: Dec. 1

## Course Outline

<u>Topic</u>	<u>Reading Assignment (see Refs. for abbreviations)</u>
1. Introduction and Overview (2 classes)	OW, Chapter 1; DM, Chapter 1
2. Travel Demand Theory (3 classes)	OS, Chapter 2
3. Activity-Based Travel Model System Framework (2 classes)	PB
4. Linear Regression (5 classes)	BL, Chapter 2; PR, Chapter 2 & Appendix 4.3; CN1 and CN2
5. Linear Regression Specification Issues (5 classes)	OW, Chapter 4; PR, Chapter 5
6. Choice Theory Fundamentals (3 classes)	SIC, Chapters 1-3.3
7. Binary Choice Models: Basics, Estimation, and Fit Measures (5 classes)	SIC, Sections 3.4-3.5; BL, Sections 4, 4.1, 4.2, 4.4, 4.5.
8. Multinomial Choice Models: Basics, Segmentation Elasticity Effects, and Advanced Formulations (4 classes)	SIC, Chapters 4-10; BL, 5.1-5.2
9. Advanced Choice Models (1 class)	-

## References

OW	-	Ortuzar and Willumsen, <i>Modeling Transport</i>
DM	-	Domenich and McFadden, <i>Urban Travel Demand</i>
OS	-	Oi and Shuldiner, <i>An Analysis of Urban Travel Demand</i>
PB		Pinjari and Bhat, "Activity Based Travel Demand Analysis," <i>A Handbook of Transport Economics</i> , Chapter 10, pp. 213-248, edited by A. de Palma, R. Lindsey, E. Quinet, and R. Vickerman, Edward Elgar Publishing Ltd.
BL	-	Ben-Akiva and Lerman, <i>Discrete Choice Analysis</i>
PR	-	Pindyck and Rubinfeld, <i>Econometric Models and Economic Forecasts</i>
CN1	-	Class Notes 1: Estimation - General and Linear Regression
CN2	-	Class Notes 2: An Introduction to SPSS for Windows
SIC	-	Koppelman and Bhat, <i>A Self-Instructing Course (SIC) in Mode Choice Modeling: Multinomial and Nested Logit Models</i> , prepared for U.S. Department of Transportation, Federal Transit Administration