



## TTE 6307

# Statistical and Econometric Methods

The objective of this course is to provide students with a general background in the application of various statistical and econometric analysis techniques and to provide new ideas for analyzing data in their research. The course will present a number of model-estimation methods that are used in transportation data analysis and other subject areas that deal with data analysis. While examples will be drawn primarily from transportation, the methods presented have broad applications to a variety of data-analysis applications in civil engineering and beyond, and these will be discussed in the course. The material covered goes well beyond the techniques typically covered in statistics courses. While the course will emphasize model estimation and application, the underlying theory and limitations will be discussed to ensure that the methods are properly applied and understood.

### **Time and location:**

Fall semester, Wednesdays 2:00pm - 5:00pm, in room ENG 201

### **Course requirements:**

- Nine empirical assignments. All involve data analysis with existing databases. Students will present their results with a short write-up.
- There will be take home mid-term exam that will have students work on a database and perform an appropriate write-up. The intent of this exam is to develop modeling and paper-writing techniques. Because the exam is intended as a learning experience, its value is only 10% of the course grade.
- There will be a comprehensive final exam.
- Students will be given a data set from which they will be required to estimate a statistical model using methods presented in the class. They will complete a research paper based on this estimated model.

### **Grade distribution:**

Empirical assignments (20%), Mid-term exam (10%), Research paper (40%), Final exam (30%)

### **Prerequisites:**

Graduate standing, undergraduate courses in econometrics or statistics

### **Required materials:**

**Text:** Washington, S., M. Karlaftis, and F. Mannering (2011) Statistical and econometric methods for transportation data analysis, Second Edition, Chapman & Hall/CRC.

**Course Notes:** F. Mannering (2019) TTE 6307 Statistical and Econometric Methods. Available at Pro-Copy, 5219 E. Fowler Ave., Tampa, FL 33617 ([www.pro-copy.com](http://www.pro-copy.com)).

# Course contents

Lecture 1	Course introduction
Lecture 2	Review of estimators and their properties; least squares regression; maximum likelihood estimation (Text chapters 1-3)
Lecture 3	Specification errors; simultaneous equation models (Text chapters 4 and 5)
Lecture 4	Count-data models; Poisson regression; negative binomial; zero-inflated models count-data models (Text chapter 11)
Lecture 5	Discrete outcome models and analysis of discrete data; economic theory and discrete choice models (Text chapter 13)
Lecture 6	Properties and estimation of multinomial logit models (Text chapter 13)
Lecture 7	Nested logit/generalized extreme value models (Text chapter 13)
Lecture 8	Hypothetical data; compensating variation and consumer welfare effects (Text chapter 13)
Lecture 9	Ordered probability models with fixed and random effects (Text chapter 14)
Lecture 10	Duration models; censored data; parametric and nonparametric estimation (Text chapter 10)
Lecture 11	Self-selectivity and discrete/continuous models (Text chapter 15)
Lecture 12	Introduction to random parameter models (mixed logit model) (Text chapter 16)
Lecture 13	Latent-class logit model (Text chapter 16)
Lecture 14	Random parameter count-data models (Text chapter 16)
Lecture 15	Emerging Methods, Discussion, Course summary