IMPACT ANALYSIS FOR TRANSPORTATION

COURSE: UPP 565 [UPP Special Topics Course]
CALL NO.: 61817
PREREQUISITES: UPP 560, 561 and 513.
TIME: 1:00 -- 4:00 P.M. Wednesdays
LOCATION: 100 SH
DURATION: August 25 to December 5, 2003
FINAL EXAMS WEEK: December 9-12, 2003

Instructors: Co-Taught by:
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Course Web Site: Login to *http://blackboard.uic.edu*

DESCRIPTION OF THE COURSE

This special topics course will cover several methodologies pertaining to assessing the impacts of transportation. The student will be presented with basic concepts in impact evaluation and illustrations of typical impact assessment exercises in transportation. We will examine two approaches to evaluating impacts: a statistical modeling approach and a cost-benefit approach.

The course will be divided into four main parts:

1) Part 1 will present an introduction to the objectives, readings, assignments and other necessary information.
2) Part 2 will expand on the methodologies of UPP 513 for the purpose of policy evaluation.
3) Part 3 will present developments in CBA methodologies.
4) Part 4 will be a student-led discussion and presentations of problem construction and methodologies.

Course requirements are two take-home assignments, a guided student-led seminar, a final presentation and a final paper.

August 27: Introduction to course.

September 3: Introduction to empirical modeling and policy questions.

1) Main policy measures from statistical analysis: odds, risk, marginal probabilities, elasticities.
2) Data representation.
3) Data quality issues in transportation.
4) Types of measurement: implications for data modeling.
5) Aggregate versus disaggregate data: implications for data modeling.
6) Missing Data techniques
7) Case Deletion effects and imputation.
8) Complete Case Analysis: Estimation approaches: Review of Ordinary Least Squares (OLS) and Maximum Likelihood (ML) methods to parameter estimation.
9) Overview of estimation by SAS.

Readings

1) Gujarati, D.N. (2003). *Basic Econometrics*. Chapters 3, 4 and 9. McGraw-Hall Hill.* [Photocopied handouts].
2) Thakuriah, P., J. T. Lee and S. Niumpradit. (2003). Data Imputation. Chapter 5 of Development, Testing and Evaluation of Intelligent Databases for Motor Carrier Safety. Report for Grant No. DTTS—00-B003-IL,Bureau of Transportation Statistics, U.S. Department of Transportation.* [CourseInfo].
3) Oum, T. H. and W. G. Waters, II. (2000). Transport Demand Elasticities. Chapter 12 in *Handbook of Transport Modeling*, Hensher, D.A. and K. J. Button edited, Pergamon Press. [Photocopied handouts].
4) Pet-Armacost, J.J. and J. Sepulveda. (1999). Monte Carlo Sensitivity Analysis of Unknown Parametersin Hazardous Materials Transportation Risk Assessment. In *Risk Analysis*, Vol 19. No.6. [CourseInfo]
5) Gomez-Ibanez, J.A. (1997). Estimating whether transport users pay their way: State of the Art. In *The Full Costs and Benefits of Transportation*. Greene, D. L., D. W. Jones and M. A. Delucchi edited, Springer. [Photocopied handouts].
6) Miller, T. R. (1997). Societal Costs of Transportation Crashes. In *The Full Costs and Benefits of Transportation*. Greene, D. L., D. W. Jones and M. A. Delucchi edited, Springer. [Photocopied handouts].
7) Krupnick, A. J. and C. M. Lang (1997). Transportation and Air Pollution. The Environmental Damages. In *The Full Costs and Benefits of Transportation*. Greene, D. L., D. W. Jones and M. A. Delucchi edited, Springer. [Photocopied handouts].

September 10: Qualitative and discrete choice models and Duration Modeling.

1) Generalized Linear Models. Qualitative and Limited Dependent Variables.
2) Binary response models. Logit and Probit.
3) Marginal effects and elasticities.
4) Discrete Choice models.
5) Multinomial Logit and Conditional Logit.
6) Marginal effects and elasticities.
7) Latent variable formulations.
8) Survival analysis/duration modeling

Readings

1) Gujarati, D.N. (2003). *Basic Econometrics*. Chapter 15. McGraw-Hall Hill.* [Photocopied handouts].
2) Bhat, C. R. (2000). Duration Modeling. Chapter 6 in *Handbook of Transport Modeling*, Hensher, D.A. and K. J. Button edited, Pergamon Press.* [Photocopied handouts].
3) Louviere, J. and D. Street. (2000). Stated-Preference Methods. Chapter 8 in *Handbook of Transport Modeling*, Hensher, D.A. and K. J. Button edited, Pergamon Press. [Photocopied handouts].
4) Broyles, R. W. et al. (2003). Factors associated with the likelihood of injury resulting from collisions between four-wheel drive vehicles and passenger cars. In *Accident Analysis and Prevention* 35 (2003) 677–681. [In CourseInfo].
5) Graham, D. J. and S. Glaister. The Demand for Automobile Fuel. A Survey of Elasticities. Forthcoming in the *Journal of Transportation Economics and Policy*. [In CourseInfo].

September 17: Cross-sectional data, time series data, spatial series and panel data.

1) Cross-sections, time series, spatial series and panel data: modeling implications.
2) Autocorrelation in the linear model.
3) Time trend detection.
4) Distributed Lag Model.
5) Basic AR and MA models.
6) Detection of spatial dependence.
7) Introduction to Spatial Autoregression and Spatial Lag Models.
8) Basics of Panel/longitudinal data.
9) Fixed effects and random effects.
10) Dynamic Models and Structural Time Series.

Readings

1) Gujarati, D.N. (2003). *Basic Econometrics*. Chapter 16 and 17. McGraw-Hall Hill.* [Photocopied handouts].

2) Kitamura, R. (2000). Longitudinal Methods. Chapter 7 in *Handbook of Transport Modeling*, Hensher, D.A. and K. J. Button edited, Pergamon Press.* [Photocopied handouts].
3) Bao, S. (2000). Literature Review of Spatial Statistics and Models. [CourseInfo].
4) Anselin, L. New Tools for Spatial Data Analysis in the Social Sciences. [In CourseInfo].

September 24: Count Data Models

1) Nature of Count Data and the Poisson Stochastic Process.
2) OLS Violations.
3) Poisson Modeling.
4) Over-dispersion.
5) Negative Binomial and Gamma Distributions.
6) Zero-Inflated Poisson Models.

October 1: Student presentations on statistical treatments of a specific transportation policy area.

Recommend Readings for part 3:

1) Rossi, P.H., Freeman, H. E., and Lipsey, M.W. (1998). *Evaluation: A systematic approach* (6th ed.). Thousand Oaks, CA: Sage Publications.

2) Meyer, Michael D. and Eric J. Miller (2001). Urban Transportation Planning - A Decision-Oriented Approach. New York: McGraw-Hill Books.

3) Boardman, A, Greenberg, D,Vining, A and Weimer, D (1996), *Cost-Benefit Analysis: Concepts and Practice*, Upper Saddle River, N.J. Prentice Hall, 1996

Articles and Reports

Kamerud, D. (1988). Benefits and costs of the 55 mph speed limit: new estimates and their implications. *Journal of Policy Analysis and Management*, 7 (2).

Atkins, F. J. (2002) *A Benefit Cost Analysis of Twinning Highway 3*, by Frank Atkins, Report prepared for the Van Horne Institute, University of Calgary, January.

Gillen, D., Li, J., Dahlgren, J., and Chang, E. (2000) *Assessing the Benefits and Costs of ITS Projects: Volume 2 An Application to Electronic Toll*

Collection, California PATH program Research Report, Report number UCB-ITS-PRR-99-10

October 1: Valuing benefits and costs

1) Valuing benefits and costs using demand and supply curves.
2) Impact assessment.
3) Internal validity
4) Threats to internal validity

October 8: Impact assessment (cont'd)

1) Threats to internal validity (cont'd).
2) Randomized experiment.
3) Quasi-experiment.
4) Using statistics in impact assessment.

October 15: Benefit-cost analysis

1) Fundamental concepts.
2) Present value.
3) Discount rate.
4) Constant stream.

October 22: Benefit-cost analysis (cont'd)

1) Alternative methods to decision making
2) Annualized cost method.
3) Internal Rate of Return.
4) Benefit-cost ratio
5) Cost-effectiveness.
6) Dealing with risk.
7) Dealing with equity issues.

Remainder of semester:

1) Student-led discussion and presentations, guided by instructors, of individual transportation policy evaluations. Each student will take one entire class (3-hour period).
2) Formulation of final paper.

Exam week: Present final paper.