College of Engineering

Department of Civil Engineering

CE 551 Statistical Modeling in Transportation

Credit and Contact hours	3 / 3 (Lectures), 0 (Tutorials), 0 (Laboratory)
Required, or Elective	Elective
Course Description	This course is an advanced subject in econometrics with a focus on transportation demand modelling. This course covers a broad range of econometric modelling techniques and their applications in transport systems. Specific emphasis will be placed on estimation process of the models and their reliability in prediction. The topics of the course includes transport data analysis and modelling, linear regression models for continuous and discrete outcomes, interpretation of model estimation results, time series analysis, and survival analysis in transport systems.
Prerequisites or Co-requisites	None

Course Learning Outcomes

Students completing this course successfully will be able to:

Course Learning Outcomes (CLOs)	*Related Student Outcomes (SO)*
CLO1. Learning basic statistics and econometrics in transport modelling. K1	**SO1**
CLO2. Identifying the estimators and their properties in large scale data. K1	**SO1**
CLO3. Complete a comprehensive statistical analysis on large data using statistical packages. S1	**SO2**
CLO4. Examine transport outcomes based on econometric models in real-life transport projects through a variety of economic analysis methodologies. V2	**SO7**

Student Outcomes related to this Course

SO 1 Recognize advanced engineering knowledge, concepts, and techniques to identify, interpret, and analyze complex and real-life engineering problems.

SO 2 Provide solutions for complex and real-life engineering problems through critical thinking and the use of modern engineering tools, and identify their impact on social, global, cultural, environmental, safety, and economic factors.

SO 7 Effectively manage, individually or in groups, specialized tasks and activities in coursework, projects, assignments, and research work with a high level of autonomy and responsibility.

Topics Covered

List of Topics	Related CLOs
1. Course introduction, project assignment	CLO 1
2. Statistical inference, Regression analysis	CLO 1
3. Least squares regression; maximum likelihood estimation	CLO 2

	4. Count-data models; Poisson regression; negative binomial; zero-inflated models count-data models	**CLO 2**
	5. Discrete outcome models and analysis of discrete data; economic theory and discrete choice models	**CLO 3**
	6. Properties and estimation of multinomial logit models	**CLO 3**
	7. Multinomial logit model	**CLO 3**
	8. Data sampling (stratified, cluster, choice-based, double, enriched, and exogenous sampling)	**CLO 3**
	9. Estimation of transport projects	**CLO 4**
	10. Revision/Project Presentations	**CLO 4**
Textbook(s) and Other Required Material	• Washington, S., M. Karlaftis, and F. Mannering (2011) Statistical and econometric methods for transportation data analysis, Second Edition, Chapman & Hall/CRC. • Supportive References Train, K. (2009). Discrete choice methods with simulation, Cambridge University Press. 2nd edition (available free at: http://www.econ.berkeley.edu/books/choice2.html) • Koppelman, F. S. and C. Bhat (2006). "A self instructing course in mode choice modeling: multinomial and nested logit models." Prepared for US Department of Transportation Federal Transit Administration (available free at http://www.caee.utexas.edu/prof/bhat/COURSES/LM_Draft_060131Final-060630.pdf) • Ben-Akiva, M. E. and S. R. Lerman (1985). Discrete choice analysis: theory and application to travel demand, The MIT Press. • Ortuzar, J. D. and L. G. Willumsen (2011). Modelling transport, Wiley. 4th ed.	
Grading System	Assignments 25% Term paper 15% Project –report and oral presentation 20% Final Exam 40%	
Instructors	Dr. Khalid F. Alkahtani; Office: 2A07; Email: kkahtani@ksu.edu.sa	
Date of Review	March, 2025	