ECONGA-1102
Applied Statistics and Econometrics II
Spring 2024
Monday 6:20-8:20 PM
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Course Objective: This course is the second part of a two-semester sequence designed to teach applied statistics and econometric techniques for quantitative research and analysis. The course material is divided into five sections. The first section covers topics relating to the Generalized Regression Model and Systems of Equations, including Seemingly Unrelated Regressions and Simultaneous Equation Models and Panel Data Analysis. The second section covers topics in Macro-econometrics. The third section focuses on topics in Micro-econometrics estimation and fourth section focuses on methodology. The last section covers topics in data mining, inference and prediction and role of machine learning in that context.

Grading
Research Project & Paper 30%
Homework 10%
Mid-term 30%
Final Exam. 30%.

The project is an applied econometric research project that involves collecting an appropriate data set, conducting an econometric analysis, and writing the results in the form of a short research paper. It will be due the last week of class. You are required to form a group (preferable 4 to 6 students in each group). Details relating to the project will be provided to students in class.

Course Material
The required textbook for the course is:

- "Econometric Analysis", 8th edition, by William H. Greene, Prentice Hall (2018) (G-8th ed.).

An optional text that you may find useful is:

- "A Guide to Econometrics", 5th edition, by Peter Kennedy, Blackwell (2003) (K)

Referece book on Microeconometrics:

- "MIcroeconometrics: Methods and Applications " by A. Colin Cameron and Pravin K. Trivedi , Cambridge University Presss, May 2005 (C & T)

A good reference book on Data Mining, Inference and Prediction (free download is available via Internet).

- "The Elements of Statistical Learning" by Trevor Hastie, Robert Tibshirani & Jerome Freidman, Springers (Second Edition), 2008 (HTJ)

Computer Requirement
The statistical package R (or STATA) will be used primarily throughout the course. You are encouraged to become familiar with any of these packages. However, use of R Package is preferable and Lab session also will use R programs.

Course Outline

Week	Date	Topic	Readings/Chapters
Part I: The Generalized Regression Model & Simultaneous Equations			
1	Jan 22	Review of GLS Estimator & Seemingly Unrelated Regressions	Chap 9 and Chap 10: 10.1- 10.2 (G-8th ed.)
2	Jan 29	Simultaneous Equation Models (SEM)	Chap 10: 10.3 – 10.5 (G-8th ed.)
3	Feb 5	SEM (cont'd) and Models of Panel Data	Chap-11 (G-8th ed.), Chap 21: 21.1 – 21.2 (C & T)
Part II Topics in Macro-econometrics			
4	Feb 12	Time Series and Serial Correlation	Chap-20: 20.1-20.5 (G-8th ed.)
5	Feb 26	Time Series Models	Chap-20: 20.7-20.10 (G-8th ed.)
	Feb 26	**Submit Project Proposal**	
6	Mar 4	Non-Stationary Data	Chap-21 (G-8th ed.)
MIDTERM EXAM - March 11			
SPRING RECESS- March 18-24			
Part III: Topics in Micro-econometrics Estimation Methodology (cont'd)			
7	March 25	Binary Choice Models	Chap-17: 17.1-17.4 (G-8th ed.)
8	**Apr 1**	**Submit Model Description of Project**	
	Apr 1	Multinomial Choice Models	Chap-18: 18.1- 18.3 (G-8th ed.)
Part IV: Estimation Methodology			
9	Apr 8	Estimation Framework in Econometrics, Introduction to Generalized Methods of Moments (GMM) (provided available time permits)	Chap-12 & Chap-14: 14.1 – 14.4 (G-8th ed.)
Part V: Data Mining, Inference and Prediction			
10	Apr 15	• Overview of Data Mining and Machine Learning (ML) • Broad Categories of ML Tasks • Selected Supervised Learning Methods-Set-I: Methods for Regression and Classification problems	Elements of Statistical learning (HTF) Selected sections of Chap 1-9
11	Apr 22	• Selected Supervised Learning Methods-Set-II: Decision-Tree Models and Ensemble Methods- Bagging and Boosting	Elements of Statistical learning (HTF) Selected sections of Chap 9-12 and Chap 15.
12	Apr 29	**Research Project Presentation (Expanding to Lab sessions)**	**Research Project Presentation (Expanding to Lab sessions)**
FINAL EXAM	***May 6***		
Fianl Research Paper Submission	May 10	**Final research paper is due by 11 PM & should be submitted via Assignment location in NYU Brightspace (as well as via email to me).**	

** Both the text book sections mentioned above and class notes are required to study the course materials included in Part 1- Part IV. For topics included in Part V, students are advised to read chapter 1 & 2 of the reference book (HTF) and class notes to facilitate the overall understanding of these new topics. In depth analysis of these topics are beyond the scope of this course.