

Course Syllabus
ECON 9730: Advanced Econometrics
FALL 2012, CRN: 86235
TR 9:30 - 10:45 A.M.; ROOM: SPARKS HALL 321

Professor: Shif Gurmu

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Office Hours: Tuesday 1:00 - 2:00 p.m.; Thursday 1:00 - 2:00 p.m.; or by appointment

Course Objectives: The course deals with econometric methods and applications designed for the analysis of cross-section and panel data models. It can be viewed as a course in microeconometrics, since we cover methods that are most often used in empirical microeconomic research. The main topics covered are maximum likelihood & GMM methods, panel data models, semiparametric and nonparametric methods, limited dependent variable models, and qualitative response models. Single as well as simultaneous equations models will be treated. Important topical applications will be treated. The course takes 'ECON: 9710: Econometrics I: Statistical Foundations' and 'ECON 9720: Econometrics' as pre-requisites.

Required Texts:

Cameron, Colin A. and Pravin K. Trivedi (2005), *Microeconometrics: Methods and Applications*, New York: Cambridge University Press.

Wooldridge, Jeffrey (2010), *Econometric Analysis of Cross Section and Panel Data* (Second edition), Cambridge: MIT Press.

Cameron, Colin A. and Pravin K. Trivedi (2009), *Microeconometrics Using Stata*, College Station: Stata Press.

Recommended Text:

Hsiao, Cheng (2003), *Analysis of Panel Data*, Second Edition, New York: Cambridge University Press (Paperback).

Wooldridge (2010) and Cameron and Trivedi (2005) are the main textbooks for this course. These two books cover most of the topics to be treated in this course with varying level of rigor on some topics. Cameron and Trivedi (2005) text is oriented to the practitioner with comprehensive coverage of methods and applications in microeconometrics. Wooldridge (2010) also focuses on microeconometrics, but is relatively more advanced on some of the topics, and discusses assumptions of models in more detail. The recent book by Cameron and Trivedi (2009) explains how Stata can be used to perform regression analysis of cross-section and panel data; that is, the main topics covered in ECON 9730. Thus, Cameron and Trivedi (2009) serves as an adjunct to both Cameron Trivedi (2005) and Wooldridge (2010). Hsiao (2003) is specifically designed for panel data analysis. Other supplementary books and articles are listed under each topic.

Econometric Software: We will mostly use Stata. Stata Version 12 is available on all machines in the **Econometrics Lab (#720)** and **Open Access Student Computer Lab**, both on the 7-th floor of the Andrew Young School of Policy Studies (AYSPS) Building.
Optional - Stata is also available for purchase at GradPlan pricing (student-pricing). The software can be purchased directly from Stata corporation; see page 4 below.

ECON 9730 Class Home Page: The homepage for this course can be accessed via uLearn. The homepage will be used primarily to post data sets, announcements, assignments, and lecture notes. Please use uLearn e-mail system for all communications regarding this course.

Grading: The final grade for the course will be based on homework assignments and projects (30%), midsemester exam (30%) and a comprehensive final exam (40%). Unsatisfactory performance in either of these two components, assignments versus exams, results in a failing grade. The Plus (+) and Minus (-) grading system will be used in assigning the overall letter grade for the course. The problem sets are designed to enhance your understanding of the material covered in the course. The midsemester exam will be given in class on **Thursday, October 11**. The final exam will be given on the date and time listed on the Registrar's schedule: **Thursday, December 6, 8:00 - 10:30 AM** in Room #321 Sparks Hall. Since exceptions are not allowed, please make sure that you have no conflicts with the exam schedules. The exams must be done independently.

Further Requirements and Policies:

- You are expected to attend classes regularly.
- Please refer to the GSU Policy on Academic Honesty (Section 109; Section 1344 in the Graduate Catalog.)
- Your constructive assessment of this course plays an indispensable role in shaping education at Georgia State. Upon completing the course, please take time to fill out the online course evaluation.
- Students who wish to request accommodation for a disability may do so by registering with the Office of Disability Services. Students may only be accommodated upon issuance by the Office of Disability Services of a signed Accommodation Plan and are responsible for providing a copy of that plan to instructors of all classes in which an accommodation is sought.
- This course syllabus provides a general plan for the course; deviations may be necessary.

Learning Outcomes:

1. Students should be able to understand and use basic econometric tools - single as well as system equations - in the analysis of cross section and panel data.
2. In the context of linear and nonlinear cross section and panel data models, students should be able to understand and apply the methods of least squares, maximum likelihood, instrumental variables, and generalized method of moments.
3. Students should be able to have a basic understanding of nonparametric and semiparametric methods and apply the methods in the analysis of cross section and panel data.
4. In the context of microeconometrics models, students should be able to understand and describe the relationships between behavioral content and assumptions of underlying population models, usually cast in terms of conditional moments and conditional distributions.
5. Student should be able to understand and apply econometric tools in the analysis of pooled as well as panel data.
6. Students should be able to understand and apply econometric tools in the analysis of discrete and fractional data including qualitative, grouped, count data, and fractional response models.
7. Students should be able to understand and apply econometric tools in the analysis of corner solution responses as well as truncated, censored and sample selection data.

8. Student should be able to replicate empirical results from the applied literature and undertake empirical analysis using standard econometric software (*e.g.*, Stata) and appropriate data in economics and business.

Purchase of Stata 12 for Personal Computers (OPTIONAL):

Stata is available for purchase at GradPlan pricing (student-pricing) through arrangement between Stata Corporation and Georgia State University. Stata Version 12 can be purchased from Stata Corporation and picked up from Information Systems Technology **(IS&T) reception desk on the 13 floor of the Commerce Building**. The Commerce Building is on Broad Street, across from the RCB Building. Once you place the order, Stata Corporation will let you know if there is change in pick-up address on campus. The following versions of Stata 12 are available at student-pricing.

1. Stata/IC (Intercooled) software with PDF documentation (\$179 for perpetual license; \$98.00 for one-year license; \$65 for six-month license)
2. Small Stata software with PDF documentation (\$49.00 for one-year license; \$29 for six-month)

Unfortunately, Small Stata is limited to 1200 observations which is problematic for most of the exercises and illustrations used in this and subsequent courses. Small Stata is not helpful for graduate students at all.

Stata/IC allows datasets with as many as 2,047 variables. The number of observations is limited only by the amount of RAM in your computer. Stata/IC can have at most 798 right-hand-side variables in a model. Small Stata is limited to analyzing datasets with a maximum of 99 variables on approximately 1,200 observations. Small Stata can have at most 99 right-hand-side variables in a model.

To order a copy for pick up at the university (GSU, IS&T reception desk on the 13th floor of the Commerce Building) contact Stata Corporation directly:

Phone: 800-782-8272 (Monday through Friday 8:00 to 5:00 Central Time)

Fax: 979-696-4601

Online: <http://www.stata.com/order/new/edu/gradplans/gp-campus.html>

From Stata Corporation - Ordering online is easiest! Be sure to include your GSU.EDU email address when ordering. Once your order is processed, you will be contacted by a StataCorp sales person with campus pick up times and location. Typically, orders are available for pick up within 2 or 3 business days after the order is placed. Payment may be by credit card (Visa, MasterCard, American Express or Discover) or a faxed university purchase order. To pay by check, please mail a check payable to StataCorp with your order to

StataCorp
4905 Lakeway Drive
College Station TX 77845

Topics and Reading List¹

1. Introduction and Background

1.1. Overview and Microeconomic Data

W Chapter 1

CT (2005) Chapter.Section 1, 2.1-2.3, 2.7-2.9, 3

1.2 Basic Asymptotic Theory

W Chapter 3

CT (2005) Appendix A

1.3. Conditional Expectations, Marginal Effects and Related Concepts in Econometrics

W Chapter 2

CT (2005) Chapter.Section 5.2.4

CT (2009) Chapter.Section 10.6

1.4. OLS and Instrumental Variables Estimation

W Chapters 4-5

CT (2005) Chapter 4

CT (2009) Chapter 6

1.5. Estimating Systems of Equations by OLS and GLS

W Chapter 7

1.6. Simultaneous Equations Models

W Chapter 9

CT (2005) Chapter.Section 2.3-2.6

1.7. Stata Basics and Data Management

CT (2009), Chapters 1-2

2. Pooled Cross Sections and Panel Data Models

2.1 Pooled Cross Sections and Difference-in-Difference

W Chapter.Section 6.5

CT Chapter.Section 3.4.2

2.2 Linear Panel Models

H Chapters 1-4, 7

CT (2005) Chapters 21-22

W Chapter.Section 10-11, 13.8-13.9, 14.6

Hausman J. and W. Taylor (1981), "Panel Data and Unobservable Individual Effects", Econometrica, 49, 1377-1398.

CT (2009) Chapters 8-9

2.3 Nonlinear Panel Models

(Details provided under topics # 5 and #6 below.)

3. Core Methods: Nonlinear Models, Maximum Likelihood Method, the Generalized Method of Moments, and Hypothesis Testing

3.1. Non-linear Models

W Chapter.Section 12.1 - 12.5, 12.7

CT (2005) Chapter.Section 5.8-5.9

CT (2009) Chapter 10

3.2. Maximum Likelihood Methods

W Chapter 13

¹**W** refers to the text by Wooldridge (2010). Likewise, **CT** refers to the textbooks by Cameron and Trivedi. Further details and additional references will be provided in class.

CT (2005) Chapter.Section 5.1-5.7, 5.9-5.11

3.3. Generalized Method of Moments and Minimum Distance Estimation

W Chapters 8, 14

CT (2005) Chapter 6

Hansen, L.P (1982), "Large Sample Properties of Generalized Method of Moments Estimators", Econometrica, 50, 1029-1054.

3.4. Hypothesis and Specification Tests

W Chapter.Section 6.3, 12.6

CT (2005) Chapter.Section 7, 8.3-8.4

4. Nonparametric and Semiparametric Methods

CT (2005) Chapter 9

CT (2009) Chapter.section2.6.4, 2.6.6

Bierens, H. (1987) "Kernel Estimators of Regression Functions", in T.F. Bewley, ed. Advances in Econometrics: Fifth World Congress, Vol. 1., Chapter 3, 99-144.

Gabler, S., F. Laisney and M. Lehner (1993), "Semionparametric Estimation of Binary Choice Models With an Application to Labor-Force Participation", Journal of Business & Economic Statistics, 11, 61-80.

Gurmu, S., P. Rilstone and S. Stern (1999). "Semiparametric Estimation of Count Regression Models", Journal of Econometrics, 88, 123-150.

Gurmu, S. and J. Elder (2012), "Flexible Bivariate Count Regression Models," Journal of Business & Economic Statistics 30(2) 265-274

Klein, R.W. and R.H. Spady (1993), "An Efficient Semiparametric Estimator for Binary Response Models", Econometrica, 61, 387-421.

5. Models with Discrete Dependent Variables and Other Nonnegative Responses

5.1. Binary Choice Models

W Chapter.Section 15.1-15.8

CT (2005) Chapters 14, 23.1, 23.4, 23.8

H Chapter 7

Gurmu, S., K.R. Ihlanfeldt and W. J. Smith (2008) "Does Residential Location Matter to the Employment of TANF Recipients? Evidence from a Dynamic Discrete Choice Model with Unobserved Effects", Journal of Urban Economics, 63, 325-351.

Klein Spady (1993)

CT (2009) Chapter.Section 14, 18.1- 18.4

5.2. Multinomial and Multivariate Qualitative Response Models

CT (2005) Chapter 15

W Chapter 16

CT (2009) Chapter 15

5.3. Count Data Models

CT (2005) Chapter.Section 20, 23.7

W Chapter.section 18.1-18.5, 18.7

Gurmu, S. and P. K. Trivedi (1994), "Recent Developments in Models of Event Counts: A Survey", Thomas Jefferson Center Discussion Paper #261, University of Virginia.

Gurmu et. al. (1999)

Gurmu and Elder (2012)

Hausman, J., B.H. Hall and Z. Griliches (1984), "Econometric Models for Count Data with an Application to the Patents -R and D Relationship",

Econometrica, 52, 909-938.

CT (2009) Chapter.Section 17, 18.6

5.4 Fractional Responses (Time Permitting)

W Chapter.section 18.6

Papke, L.E. and J. M. Wooldridge (1996), "Econometrics Methods for Fractional Response Variables with an Application to 401(k) Plan Participation Rates," *Journal of Applied Econometrics*, 11, 619-632.

Papke, L.E. and J. M. Wooldridge (2008), "Panel Data Methods for Fractional Response Variables with an Application to Test Pass Rates," *Journal of Econometrics*, 145, 121-133.

6. Corner Solutions Outcomes, Censored and Sample Selection Models

6.1 Corner Solution Responses, Truncated and Censored Data

W Chapter.section 17, 19.1, 19.2

CT (2005) Chapter.Section 16.1-16.4, 16.10, 23.5

H Chapter 8

CT (2009) Chapter.Section 16.1-16.5,16.7,18.5

6.2. Sample Selection and Attrition

W Chapter.section 19.3-19.9

CT (2005) Chapter 16.5-16.9

Mroz, T.A. (1987), "The Sensitivity of an Empirical Model of Married Women's Hours of Work to Economic and Statistical Assumptions", *Econometrica*, 55, 765-799.

CT (2009) Chapter.Section 16.6