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Quantitative Methods II
Spring 2019, Thursdays, 6:00pm-8:50pm, BSB-336

DRAFT SYLLABUS, January 16, 2019

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Office Hours: Wednesdays 4-6pm, and by appointment.

Overview. This is a course on empirical methods that are useful in the investigation of hypotheses in the social sciences and the analysis of public policies and programs. The course is a detailed examination of the bivariate and multiple regression models estimated using Ordinary Least Squares (OLS), with an emphasis on constructing regression models to test social and economic hypothesis. Several special topics in regression analysis are addressed as well, including violations of OLS assumptions, the use of dummy variables, instrumental variables, regression discontinuity, difference in difference estimates, and models for panel data. Throughout, examples are drawn from the research literature in several fields, so students can see the models and methods in action.

Student Learning Objectives/Outcomes.

- Students will learn how to estimate, interpret, and present bivariate and multivariate regression models.
- Students will become familiar with the interpretation of regression coefficients, including those with linear and logarithmic variables.
- Students will learn how to structure regression models to test hypotheses relevant to public policy research.
- Students will be able to critique regression models, to test for violations of model assumptions and correct for them if present, and to assess threats to the validity of regression models in their own work and in published research articles.
- Students will learn the theory and practice of selected extensions to the basic regression framework, including instrumental variables, regression discontinuity, difference in difference estimation, and fixed and random effects.

Prerequisite. It is *necessary* to be familiar with descriptive and inferential statistics and basic concepts of probability at the level covered in Quantitative Methods I. You do not need to have any previous exposure to regression analysis. A good review is contained in Chapters 2-3 of the Stock and Watson textbook or Appendix A of Gujarati and Porter. *A solid foundation in basic math and algebra is essential, but you do not need to know calculus or matrix algebra.*

Textbooks. There are many textbooks covering this material. They vary in terms of mathematical level, the types of examples they use, and the specific topics covered. The required text by Gordon is more accessible in some ways, but not quite as thorough as some other texts. If you want a more advanced treatment and feel comfortable with a more mathematical approach, look at the texts by Stock and Watson, Gujarati and Porter, and/or Wooldridge. I will list

"alternate/optional" readings in these texts on the course schedule. If you decide to go with of the alternatives, you can skip the Gordon text. But you should definitely pick one of the texts to focus on. And everybody should buy the Angrist and Pischke book. It is relatively inexpensive. By the way, there are used copies of all these texts floating around and I will put them on reserve in the library.

Required Texts:

Gordon, Rachel A. 2015. *Regression Analysis for the Social Sciences*. 2nd Edition. New York: Routledge. ISBN-13: 978-1138812512.

Angrist, Joshua D. and Jörn-Steffen Pischke. 2014. *Mastering 'Metrics: The Path from Cause to Effect*. Princeton: Princeton University Press. ISBN-13: 978-0691152844.

Recommended/Alternative Texts:

Mark, H. Stock James &. W. Watson. 2017. Introduction to Econometrics. 3rd edition. Pearson. ISBN-13: 978-0133595420.

Gujarati, Damodar N. and Dawn C. Porter. 2008. Basic Econometrics. 5 edition. Boston: McGraw-Hill Education. ISBN-13: 978-0073375779.

Wooldridge, Jeffrey M. 2015. Introductory Econometrics: A Modern Approach - Standalone Book. 6 edition. Boston, MA: Cengage Learning. ISBN-13: 978-1305270107.

Previous editions are acceptable, but you are responsible to identify the corresponding chapters and pages that correspond to the listed readings.

Course Web Site. The course web site on Sakai serves several purposes. Mainly, it is a place to download readings (other than the textbook), lecture notes, assignments, practice questions, etc. Second, there is a discussion board where you can post questions and/or comments. Third, you can use it to send email to some or all of the other students in the class, arrange study groups, etc.

Requirements. There are three types of required assignments:

1) Problem Sets. There will be a *short* problem set due nearly every week. While this sounds burdensome, the best way to make sure you understand the week's material is to work problems. You should try to work the problems as soon as possible after the class in which the material was discussed. We will often discuss the exercises in class the day they are handed in. For this reason, *late assignments can not be accepted*. However, the lowest two problem set scores will be dropped, so you can miss a few with no grading consequences.

If you are going to miss class for any reason, you still need to submit your assignment via Sakai **by 6:00 pm on the day it is due**. If you have an actual documented emergency, you can be excused for a problem set for grading purposes, but you are still responsible for the material covered.

Students are encouraged to form study groups and to collaborate on the problem sets, particularly the estimation of models on the computer. However, *each and every student should write up his or her own answer* to ensure they have fully internalized the group discussions.

2) Tests. There will be a midterm and a comprehensive final. Both are open note, open book. You will be able to use a scientific calculator, but you will not be permitted to use a laptop or access the internet.

3) Empirical Paper. An empirical paper will be due on the last class day. A draft (not graded) will be due two weeks earlier. In the paper, you will do a short literature review, describe your data, estimate one or more regression models, and interpret the results. You should not collaborate with other students on this assignment.

Grading. Grades will be determined as follows:

Problem Sets	25 percent	(Note: lowest 2 scores dropped.)
Midterm	25 percent	
Empirical Paper	25 percent	
Final Exam	25 percent	

Given the cumulative nature of the material and the grading structure, the best way to do well in this course is to work steadily throughout the semester. After rounding the course average to the nearest integer, letter grades will be assigned on the following basis:

90-100	A
85-89	B+
80-84	B
75-79	C+
70-74	C
0-69	F

Attendance. Attendance is entirely optional. Having said that, the material covered in the lectures is essential to passing the course. *You are responsible for all material covered in the lectures whether or not it is in the textbook, readings, and slides.* You are also responsible for all announcements made in class, whether or not you attend. Thus, the best policy is to attend every class. *If you have to miss a class, due to illness or other unavoidable conflict, be sure to get the class materials distributed via Sakai and try to borrow a fellow student's notes.*

Disability. Any student in need of classroom accommodations due to disabilities should contact the Director of Disability Services, Kelly Deasy, as soon as possible. She may be reached at (856) 225-2717, kelly.deasy@rutgers.edu, or at the Rutgers-Camden Learning Center, Armitage Hall, Room 231. No accommodations can be made without the explicit approval of the Office of Disability Services. More information is available here:

https://learn.camden.rutgers.edu/disability-services-general-information

Academic Integrity Notice. *There can be absolutely no collaboration on examinations. This includes communication of any kind, sharing of books or notes, or sharing of calculators. Similarly, students must scrupulously avoid plagiarism on the final paper. The penalty I request in cases of academic dishonesty is a grade of zero (0) for the examination or assignment in question, although the final penalty is determined by the responsible university official. A grade of zero on an exam could easily lead to failing the course. In addition, the incident is reported to the Dean of Students for disposition and becomes a part of the student's record.*

Computing. The official software for the course is Stata, Version 14. Stata is freely available for student use via the linux server: http://apps.rutgers.edu in the "education" folder. It is also available in the Robeson Library computer lab. However, if you wish to purchase a copy for your own computer, you may purchase the software at an educational discount through the "Grad Plan." The cheapest alternative is a six-month license for "Small Stata" for $45. A perpetual license for Stata/IC ($198) is a better choice if you intend to do empirical work beyond this course. See http://www.stata.com/order/new/edu/gradplans/student-pricing/ for more details.

Schedule and Readings. The schedule and readings are posted on the course website in Sakai. The tentative schedule is shown below, ***but always consult the online version for updates***.

Note the following dates:

Midterm	**March 14**
Final	**May 9**

Early or late examinations cannot be given except in extreme circumstances, so plan your schedule accordingly!

Laptop Computers. Laptop computers may be used in class, but only for class purposes. Class purposes include taking notes, working with Stata, and viewing lecture notes or research articles as they are discussed in class. You may not use laptop computers to text, IM, surf the web, answer emails, do assignments for other classes, or any other purpose. Such use interferes with your own learning and distracts fellow students. Students who violate these rules will be prohibited from further laptop use.

824:709 Quantitative Methods II * = *optional/alternative* *Tentative Schedule, January 16, 2019* *Consult Sakai for updates*		
Class/Date	**Due**	**Major Topics** Assigned Readings
1. Jan. 24		**Review of Probability and Statistics** Stock and Watson, Chapters 2-3. Hypothesis Testing Summary. **Introduction to Stata** Gordon, Chapters 3 and especially 4.
2. Jan. 31	Problem Set 1	**Bivariate Regression** Gordon, Chapter 5. *optional/alternative* * Stock and Watson, Chapter 4-5. * Wooldridge, Chapter 2 * Gujarati and Porter, Chapters 2-5
3. Feb. 7	Problem Set 2	**Multiple Regression I** Gordon, Chapter 6. Angrist and Pischke, Chapter 2 Jargowsky, *Omitted Variable Bias*. *optional/alternative* * Stock and Watson, Chapter 6 * Wooldridge, Chapter 3 * Gujarati and Porter, Chapters 7
4. Feb. 14	Problem Set 3	**Multiple Regression II** Gordon, Chapter 10. *optional/alternative* * Stock and Watson, Section 7.1 * Wooldridge, Chapter 4 * Gujarati and Porter, Chapter 8
5. Feb. 21	Problem Set 4	**Dummy Variables** Gordon, Chapter 7. Devaney, Barbara, Linda Bileimer, and Jennifer Schore. 1992. "Medicaid Costs and Birth Outcomes: The Effect of Prenatal WIC Participation and the Use of Prenatal Care." Journal of Policy Analysis and Management 11:573-92. *optional/alternative* * Stock and Watson, Section 8.2 * Wooldridge, Sections 7.2-7.4 * Gujarati and Porter, Chapter 9

6. Feb. 28	Problem Set 5	**Interactions & Tests** Gordon, Chapter 8. Jargowsky, *Using the F Statistic to Test Hypotheses*. Jeanne Brooks-Gunn, Greg J. Duncan, Pamela Kato Klebanov and Naomi Sealand. 1993. "Do Neighborhoods Influence Child and Adolescent Development," American Journal of Sociology, 99: 353-395. *optional/alternative* * Stock and Watson, Sections 7.2-7.4. * Wooldridge, Section 4.5 * Gujarati and Porter, Chapter
7. Mar. 7	Problem Set 6	**Functional Forms** Gordon, Chapter 9 Jargowsky, *Guide to Logarithms and Exponents*. Alan B. Krueger, "How Computers Have Changed the Wage Structure: Evidence from Microdata, 1984-1989," *Quarterly Journal of Economics* **108**: 33-60. *optional/alternative* * Stock and Watson, Section 8.2. * Wooldridge, Chapter 2 * Gujarati and Porter, Chapters 2-5
Mar. 14		***Midterm Exam*** *Open note, open book.* *Bring a calculator!*
Mar. 21		***Spring Break – University Closed***
8. Mar. 28		**Review of Midterm** **Outliers, Heteroskedasticity, and Autocorrelation** Gordon, Chapter 11. Krishna Pendakur, "Heteroskedasticity and Autocorrelation Across Errors."
9. Apr. 4	Abstract of Final Paper Due	**Instrumental Variables** Angrist and Pishchke, Chapter 3 Jargowsky, Instrumental Variables. Jargowsky and Park (2009), "Cause or Consequence? Suburbanization and Crime in US Metropolitan Areas," especially pages 39-41.
10. Apr. 11	Problem Set 7	**Regression Discontinuity Designs** Angrist and Pischke, Chapter 4

11. Apr. 18	Draft of Final Paper Due	**Panel Data Regression Models** Angrist and Pischke, Chapter 5. *optional/alternative* * Stock and Watson, Chapter 10. * Gujarati and Porter, Chapter 16. * Wooldridge, Chapters 13,14.
12. Apr. 25	Problem Set 8	**Introduction to Binary Dependent Variables** **TBA**
13. May 2	Final Paper Due	**Student Presentations** **(Optional Topic) The OLS Model in Matrix Notation** Jargowsky, Matrix Notation and OLS. *optional/alternative* * Stock and Watson, Section 18.1 and Appendix 18.1. * Gujarati and Porter, Appendices B and C. * Wooldridge, Appendix E.
May 9		***Final Exam*** *Open note, open book.* *Bring a calculator!*