University of Missouri
Department of Political Science

<u>Political Science 9030: Linear Models</u>

Purpose: The purpose of this course is to provide an in-depth understanding of OLS (Ordinary Least Squares) Regression and its application in social scientific research. In order to do so, the course will expose you to (and expect you to grasp) the theoretical and mathematical underpinnings of the technique, but will also focus most heavily on the implementation of OLS. It will also provide information on useful extensions of the technique that help the researcher deal with issues of nonlinearity and simultaneity in cross-sectional data. Finally, the course will offer a very basic introduction to time-series and MLE, in order to provide students with a foundation for more advanced coursework in statistical methods.

Required Materials: All analysis for the course will be conducted in STATA. The program is available on university machines, but if you do not own a copy I strongly encourage you to purchase it. The Wooldridge textbook is required for the course. You will need to access data and other online resources in order to complete assignments and you must, therefore, purchase the 4th edition, which includes those resources.

Jeffrey Wooldridge. 2009. *Introductory Econometrics: A Modern Approach* 4th ed. South Western Cengage Learning. ISBN# 13-978-0-324-66054-8

Course Assignments

Success in the course depends very heavily on attending class and completing all assigned readings and homework problems. However, because you are graduate students, none of these things are required. Readings are listed in this syllabus and problems will be assigned each week. You will have access to a solutions manual after the assignment date and we will discuss problems in seminar, but they will not be collected or graded. Your performance in the course will be evaluated on the basis of two examinations (each worth 25% of the course grade), a replication paper using the statistical methods covered in the seminar (25%), homework (15%), and participation in seminar (10%).

Late Work: I do not accept late work or allow make-ups for unexcused absences. Assignments are due on the date given in class or on the syllabus and will not be accepted after that date, except under the most unique and extreme of circumstances.

Academic Dishonesty: Academic integrity is fundamental to the activities and principles of a university. All members of the academic community must be confident that each person's work has been responsibly and honorably acquired, developed, and presented. Any effort to gain an advantage not given to all students is dishonest whether or not the effort is successful. The academic community regards breaches of the academic integrity rules as extremely serious matters. Sanctions for such a breach may include academic sanctions from the instructor, including failing the course for any violation, to disciplinary sanctions ranging from probation to expulsion. When in doubt about plagiarism, paraphrasing, quoting, collaboration, or any other form of cheating, consult the course instructor.

Special Accommodations: Please let me know as soon as possible if:

- You anticipate barriers related to the format or requirements of this course.
- You have emergency medical information to share with me.
- You need to make arrangements in case the building must be evacuated.

If you require disability-related accommodations (such as a notetaker, extended time on exams or captioning), please establish an Accommodation Plan with the Disability Center:

- disabilitycenter.missouri.edu
- S5 Memorial Union
- 573-882-4296

After you have registered, please notify me of your eligibility for reasonable accommodations. For other MU resources for students with disabilities, click on "Disability Resources" on the MU homepage.

Algebraic Mastery: A basic algebraic understanding of statistics will help you in many ways. Perhaps most importantly, it will refine and clarify your intuitions. In addition, most advanced statistics consists of small changes to the basic model, so it is useful to master this basic model. I ask, therefore, that you pay particular attention to:

- Chapters 2, 3, and 4: understand and master all math, except the appendices.
- Memorize Appendix A, pages 595-697!
- After Chapter 4, we will not use much math. However, there are two critical exceptions for which you will be held responsible. Master the short pages on heteroskedasticity (Chapter 8, pages 264-269) and serial correlation (Chapter 12, pages 408-410). Your goal will be to understand how these two sets of pages differ from the basic model in Chapters 2-4.

If you have any questions about any of these policies, please feel free to ask me.

Course Outline

Part I: Multiple Regression Analysis

Date	Topic	Chapter
January 22, 24	Preliminaries	1 & Appendices
January 29, 31	Simple Regression	2
February 5, 7	Simple regression (cont.)	2 (cont)
February 12, 14	Multiple regression: estimation	3

*** Research topic due February 12

February 19, 21	Multiple regression: inference	4
February 26, 28	Regression: large sample properties 5	
March 5, 7	Review & Exam	

*** 1st exam on March 7 ***

Part II: Violation of Regression Assumptions and Solutions

March 12, 14	Nonlinearity	6, 7

*** Dataset(s) or sources due March 10

| March 19, 21 | Heteroskedacticity | 8 |

SPRING BREAK

April 2, 4	$E(u) \neq 0$	9.1-9.2, 15.1-15.6
April 9, 11	Autocorrelation	10.1-10.3,11.1,
April 16, 18	Autocorrelation (cont.)	12.1-12.3
April 23, 25	Limited Dependent Variables	17.1
April 30, May 2	Limited Dependent Variables	17 (remainder)
May 7, 9	Additional Topics	
	2nd exam handed out on May 9	

Research paper due May 13