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INTRODUCTORY STATISTICS
Fall 2015 Syllabus

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Class Location: Center for Law and Justice, Room 025
Lab Location: Center for Law and Justice, Room 567
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COURSE DESCRIPTION

The purpose of this course is to provide a firm foundation for the quantitative analysis of relationships between variables in criminology and criminal justice. It is required for partial fulfillment of the support sequence for the Ph.D. program in criminal justice. The heaviest emphasis in the course will be devoted to the linear regression model, including its estimation, interpretation, assumptions, and diagnostics. This is because the linear regression model is the workhorse of quantitative analysis, and because many of its underlying assumptions apply also to the more general models that will be considered in Intermediate Statistics and Advanced Statistics. Time permitting, more specialized regression topics will be considered, including ways to deal with missing data, quantile regression, and time series regression.

Course Objectives

- Expertise with the mathematics and interpretation of the linear regression model.
- Knowledge of the key assumptions of the linear regression model, and the consequences of their violation for statistical inference.
- Ability to diagnose and remediate violations of regression assumptions.
- Familiarity with the use of the Stata software for regression models and diagnostics.
- Application of the linear regression model to an independent research problem, along with a consideration of its strengths and limitations as it relates to that problem.

Course Prerequisite

It is assumed that students have successfully completed a graduate-level course in descriptive statistics and univariate inference, and have a rudimentary level of understanding of computer-based statistical programs (e.g., SPSS, SAS, Limdep, Stata, R). For doctoral students in the School of Criminal Justice, the prerequisite includes the pre-doctoral "Stats Camp," which provides coverage of these elementary topics in statistics. Comfort with algebra is assumed.

COURSE MATERIALS

The course will rely heavily on the statistical program, Stata. Students are not required to purchase the program, although Rutgers doctoral students are entitled to a free, temporary but renewable Stata license (specifically, Stata MP2 14 for Linux, Mac, or Windows) through the university's software portal (https://software.rutgers.edu). Special prices and licenses for students are also available on the software website (http://www.stata.com). Students who do not wish to purchase the software or are not entitled to a university license will have access to it in the School of Criminal Justice computer lab (Center for Law and Justice, Room 567).

Required Books

- Alan C. Acock. (2014). *A Gentle Introduction to Stata* (4th edition). College Station, TX: Stata Press.
- David Weisburd and Chester Britt. (2014). *Statistics in Criminal Justice* (4th edition). New York: Springer.
- Wooldridge, Jeffrey M. (2013). *Introductory Econometrics: A Modern Approach* (5th edition). Mason, OH: South-Western Cengage Learning.

Course Handouts

Slides and notes for most of the topics considered in this course will be made available by the instructor. They will be posted in a dedicated class folder on Dropbox (http://www.dropbox.com).

Recommended Books on the Linear Regression Model

- Berry, William D. and Stanley Feldman. (1985). *Multiple Regression in Practice*. Newbury Park, CA: Sage Publications.
- Gujarati, Damodar N. and Dawn C. Porter. (2009). *Basic Econometrics* (5th edition). New York: McGraw-Hill/Irwin.
- Lewis-Beck, Michael S. (1980). *Applied Regression: An Introduction*. Newbury Park, CA: Sage Publications.
- Pedace, Roberto. (2013). *Econometrics for Dummies*. Hoboken, NJ: John Wiley and Sons.

Recommended Books on Statistical Analysis Using Stata

- Baum, Christopher F. (2006). *An Introduction to Modern Econometrics Using Stata*. College Station, TX: Stata Press.
- Kohler, Ulrich and Frauke Kreuter. (2012). *Data Analysis Using Stata* (3rd edition). College Station, TX: Stata Press.

COURSE GRADING

The grading scale that will be used for the final semester grades is as follows:

A	90.0% or higher	(Outstanding)
B	80.0% to 89.9%	(Good)
C	70.0% or 79.9%	(Satisfactory)
F	69.9% or lower	(Unsatisfactory)

Grading will be based on the following four criteria:

Class Preparation	10%
Homework Assignments	30%
Midterm Exam	30%
Empirical Project	30%
	100%

Class Preparation (10%)

Students are expected to have read and to be conversant (to the extent possible) with all of the required reading material for each class meeting. Some of this material will be of a technical nature, so the goal of the class meetings will be to help students understand what they have read (both conceptually and algebraically), and to work through empirical applications of key concepts. In fact, it might be good practice to read the assigned material on two occasions—once before the class meeting (for initial familiarity), and again shortly after the class meeting (for improved comprehension).

Homework Assignments (30%)

There will be no more than five (5) homework assignments given throughout the semester. They are to be e-mailed to the teaching assistant by the beginning of the class periods during which they are due. The assignments will be problem sets using data made available by the instructor. The objective of each of the homework assignments is to give students hands-on experience using statistical software (Stata) to manipulate data and to estimate a variety of statistical tests.

The teaching assistant will also host a weekly lab session to answer questions about the homework assignment. Students are also encouraged to work in pairs or in small groups on the homework assignments. While joint results may be reported, each student must provide his or her own interpretations of the findings. Late homework assignments will not be accepted, unless the student has given prior notification and approval has been granted by the instructor.

Midterm Exam (30%)

About midway through the semester, students will be given a take-home exam which they will have one week to complete. The exam will encompass material covered in the textbook readings, course handouts, and homework assignments. It will require students to integrate course material with research applications. Students will be required to work independently on the exam, with no assistance from their peers.

Empirical Project (30%)

In lieu of a final exam, the semester will culminate in an independent research project on a topic of the student's choosing. A written report will be submitted in the form (although not necessarily the length) of a journal manuscript, with sections for an introduction, literature review, hypotheses, data, methods, results, and discussion/conclusion, as well as references, tables, and figures. Because this course is concerned with the linear regression model, students will be expected to demonstrate proficiency with its application to their research problem. This means that they will have to think carefully about the underlying assumptions of their model, evaluate the fit of the model to their data, diagnose potential violations of key assumptions or other problematic issues, and identify

plausible solutions to these issues. It is expected that the written project will be 15-20 pages in length.

Done strategically, this project can serve as the start of a comprehensive exam or other empirical paper. Students are welcome (and are in fact encouraged) to use this project as an opportunity to consult with their faculty advisor or mentor, and to make substantial progress on analyses that can lead to a manuscript.

COURSE POLICIES

Announcements

As needed, e-mail will be utilized to post course announcements (e.g., class cancellation due to inclement weather) as well as to occasionally provide links to items that are relevant for the statistical topics covered in this course (e.g., blogs, journal articles).

Students with Disabilities

Students with a documented disability who wish to discuss special accommodations should contact the instructor as soon as possible at the beginning of the semester. For information on documentation and reasonable accommodations, students may consult the website of the Office of Disability Services at http://disabilityservices-uw.rutgers.edu.

Classroom Climate

Disruptive behavior in the classroom cheats other students of the opportunity to learn. Examples include arriving late to class, leaving and re-entering the classroom during lecture, talking excessively, using cell phones, eating, reading outside material, and persisting in speaking without being recognized. The instructor reserves the right to ask disruptive students to leave the classroom.

Academic Integrity

The instructor will uphold Rutgers University policies concerning ethical behavior and academic integrity, and students are expected to familiarize themselves with these policies. The relevant principles, policies, and disciplinary procedures can be accessed from the university's website at http://academicintegrity.rutgers.edu.

COURSE SCHEDULE

All readings are to be completed by the class date listed. Assignments due are listed in italics. This schedule is subject to change depending on time demands.

Class Date	Class Topic	Readings
	Bivariate Analysis	(Weisburd & Britt)
Thu., Sept. 3	Contingency Tables	Chap. 9, 13
Thu., Sept. 10	Comparisons of Two Means	Chap. 10, 11
Thu., Sept. 17	Comparisons of Three or More Means *Homework Assignment #1 Due*	Chap. 12
Thu., Sept. 24	Correlation Coefficients	Chap. 14, 15
	Least Squares Regression Model	(Wooldridge)
Thu., Oct. 1	Simple Regression Model *Homework Assignment #2 Due*	Chap. 1, 2
Thu., Oct. 8	Multiple Regression Model	Chap. 3, 4
Thu., Oct. 15	Multiple Regression Model (cont.) *Homework Assignment #3 Due* *Midterm Exam Taken Home*	Chap. 5
Thu., Oct. 22	Non-Linearity and Non-Additivity *Midterm Exam Due*	Chap. 6
Thu., Oct. 29	Linear Dependence and Multicollinearity	Chap. 7
Thu., Nov. 5	Non-Spherical Disturbances *Homework Assignment #4 Due*	Chap. 8
Thu., Nov. 12	Model Misspecification	Chap. 9
Thu., Nov. 19	NO CLASS – A.S.C. ANNUAL MEETING	NA
Thu., Nov. 26	NO CLASS – THANKSGIVING RECESS	NA
Thu., Dec. 3	Measurement Unreliability and Invalidity *Homework Assignment #5 Due*	NA
Thu., Dec. 10	Influence Analysis	NA
Thu., Dec. 17	*Empirical Project Due via E-mail, 10:00 am*	