Class
Instructor: Lenna Nepomnyaschy, Associate Professor
Email: lennan@ssw.rutgers.edu
Time: Wednesdays, 9:30 – 12:10
Location: 120 Albany St. Classroom A

Required Lab
Instructor: Alexandra Haralampoudis, Doctoral Student
Email: alexandra.haralampoudis@rutgers.edu
Time: Wednesdays, 2:00 – 3:30
Location: 120 Albany St. Classroom A

Course Overview
This course, the first of the statistics sequence for social work doctoral students, will focus on applied regression analysis and related multivariate methods. Linear regression will be covered in depth, including regression assumptions, model specification, diagnostics, and interactions (moderation) effects. Analysis of dichotomous outcomes will also be introduced using linear probability models. Students will learn to use the Stata statistical package for all analyses and class assignments. Each homework assignment will build on the previous, with the final product being the back end of a journal-quality empirical paper for publication.

Required Software:
This course requires that students learn and use the Stata Statistical Software Package for hands-on data analysis and statistics applications for class assignments.

- Stata is available for all employees (GRAs, staff, faculty) for free download from the OIRT software portal: https://software.rutgers.edu/
- Stata is available to all students in any Rutgers computer lab as well as the Doctoral Student Computer lab in the SSW Annex
- Students may also purchase their own version of Stata at discounted rates through the Rutgers Office of Instructional Technology: http://www.stata.com/order/new/edu/gradplans/gp-direct.html

- BEFORE MAKING ANY SOFTWARE PURCHASE, CONTACT PROFESSOR

Required Texts (2)
Student Resources (access with Rutgers Netid): https://study-sagepub-com.proxy.libraries.rutgers.edu/mehmetogluandjakobsen/student-resources


**Suggested Supplementary Resources and Texts**

**Writing about Quantitative Analysis**
Study guide: http://www.press.uchicago.edu/books/miller/multivariate/index.html

**THIS IS SUPER HELPFUL**
See Jane Miller’s website for pdfs, videos and other material:
http://policy.rutgers.edu/faculty/miller/

**More In-Depth Applied Regression & Introductory Econometrics Texts**


**Specialized Regression Topics**
Available through Rutgers Libraries:

https://dx-doi-org.proxy.libraries.rutgers.edu/10.4135/9781412985628

**General Stata Books**


Course Requirements
Students’ work will be evaluated on the following course requirements (detailed instructions to follow).

Homework Assignments (4 total) = 50%
There will be FOUR (4) homework assignments, which will be based on the skills and concepts introduced during class and lab and on the required readings. Assignments will include hands-on application of statistical formulas to basic data, writing syntax to create Stata output from a dataset, creating tables and graphs from output, interpreting output, and writing up methods and results of analyses. Assignments will build on one another leading to the mid-term and final assignment that will include most of the previous elements.

Homework #1: Univariate descriptive analysis & bivariate regression
Estimating, interpreting, and writing up results from descriptive tables and bivariate regression models

Homework #2: Multiple Regression
Writing a methods section and estimating, interpreting, and writing up results from a series of multiple regression models

Homework #3: Interaction Effects
Estimating, interpreting, and writing up results from interaction effects (moderation) models with continuous dependent variables

Homework #4: Linear Probability Regression Models for Binary Outcomes
Estimating, interpreting, and writing up results from linear probability models with a binary dependent variable

Final Assignment = 40%
The final assignment will consist of a complete data analysis project which will build on all the prior homework assignments. Analyses will include estimation of multiple linear regression models, interaction effects models with a continuous outcome, and models with binary dependent variables. The written assignment will take the form of the Methods, Results, and (brief) Discussion sections of a journal-style quantitative empirical paper. Students will describe their data, sample, measures, and analytic strategy, describe the sample characteristics, interpret results from their bivariate and multivariate models, and provide a brief discussion of the answer to their question and of the limitations of the analyses related to violations of regression assumptions.

Presentation of Final Assignment = 5%
Students will present a working draft of their final assignment to the class in a PowerPoint presentation in order to provide (for peers) and receive feedback as to final steps (10 minutes maximum, similar to a conference presentation).

Peer-reviewed article submission and discussion = 5%
Each student will find and submit several peer-reviewed scholarly articles that utilize multiple regression estimation for the class to discuss. Students are expected to read the articles to discuss in a specific class. Articles will be submitted one week prior to discussion date.

It goes without saying that students are expected to attend every class, arrive on time and participate in class discussions and exercises. While there is not specific course credit associated with attendance and participation, absences, being late to class, and lack of participation and preparation will substantially impact students’ overall grades.

**Grading**

Grade cut-offs are as follows (scores of .5 and above will be rounded up):

- A  92-100
- B+ 87-91
- B  82-86
- C+ 77-81
- C  70-76
- F  0-69
<table>
<thead>
<tr>
<th>Week &amp; Date</th>
<th>Topic</th>
<th>HW Dates &amp; Topic</th>
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<tbody>
<tr>
<td>Week 1: Sept 4</td>
<td><strong>Special Time:</strong> Class &amp; Lab combined (2:00-4:00): Intro to Stata</td>
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| Week 2: Sept 11 | Class: Intro to Quantitative Analyses  
*Lab: Data Librarian -(Ryan Womack)- Searching for Data, Continue Intro to Stata* | |
| Week 3: Sept 18 | Class: Intro to Bivariate Regression  
*Lab: Variable construction & descriptive statistics* | HW #1: Assigned: Univariate Statistics & Bivariate Regression |
| Week 4: Sept 25 | Class: Bivariate Regression Cont’d  
*Lab: Cont'd construction & bivariate regression* | |
| Week 5: Oct 2 | Class: Dummy Variables & Intro to Multiple Regression  
*Lab: Bivariate regression* | HW# 2 Assigned: Multiple regression |
| Week 6: Oct 9 | Class: Multiple Regression Cont’d  
*Lab: Multiple Regression* | HW # 1 Due |
| Week 7: Oct 16 | Class: Multiple Regression Cont’d  
*Lab: Multiple Regression* | |
| Week 8: Oct 22 | Class: Interaction Effects  
*Lab: Interaction effects* | HW# 3 Assigned: Interaction effects |
| Week 9: Oct 30 | Class: Interaction Effects  
*Lab: interaction Effects* | HW # 2 Due |
| Week 10: Nov 6 | Class: Interaction Effects  
*Lab: Interaction Effects* | |
| Week 11: Nov 13 | Class: Intro to Binary Outcomes  
*Lab: Interaction Effects* | HW #4 Assigned: Binary Outcomes |
| Week 12: Nov 20 | Binary Outcomes Cont’d  
*Binary Outcomes* | HW #3 Due |

THANKSGIVING BREAK - NO CLASS - NOVEMBER 27

| Week 13: Dec 4 | Class: Student Presentations  
*Lab: Binary Outcomes* | |
| Week 14: Dec 11 | Class: Student Presentations  
*Lab: Review for Final Assignment* | HW #4 Due |
| Week 15: Dec 18 | Class: Wrap-Up, Intro to Adv. Methods  
*Lab: Review for Final Assignment* | **Final Assignment Due (12/21)** |
Detailed Course Outline
Please note: In addition to the required readings for each week, there are sample empirical articles listed (some TBA). I will be adding (or substituting) relevant peer-reviewed empirical papers that use the various methods that we are covering as we go, including those submitted by students. Thus, each week there will be alternate journal articles that students will be required to read.

**Week 1: September 4, 2019 – SHORTENED CLASS 2:00-4:00 pm**

**Topics: Intro to Stata & to Course**
- Have Stata downloaded on your laptops

**Required Reading:**

MJ: Chapter 2: Introduction to Stata, (p. 17-33), Just **SKIM** so you are slightly familiar with Stata interface

**Read One (or more) of the Following for Discussion over the next two weeks:**
Social Science Replication Crisis – most recent updates

OR

OR

OR

**Week 2: September 11, 2019**

**Topics: Introduction to quantitative data & analysis**
- Overview of course
- Concepts, Examples, Terminology, Data, Types of Variables

**Required Reading:**
Wooldridge, Jeffrey. Chapter 1: The Nature of Econometrics and Economic Data (p. 1-21)

Gordon, Chapter 5: Basic Descriptive Statistics, Types of Variables (p. 97 – 123)
Sample Papers:
- Read abstracts to understand the questions the studies are asking
- What are the dependent & independent variables
- Draw out a conceptual diagram
  - Nepomnyaschy & Waldfogel, 2007
  - Gold & Nepomnyaschy, 2018
  - O’Connor & Nepomnyaschy, 2019

Suggested Reading:
*Reviews of Probability and Inferential Statistics (this should all be a review from your summer stats course)*

**Week 3: September 18, 2019**
Topics: Introduction to Bivariate Regression
- Introduction and overview of regression analysis
- Calculating bivariate regression coefficients

*In-class exercise: Calculating bivariate regression coefficients*

HW #1 Assigned: Descriptive & Bivariate Regression Analyses, Due: Week 6

**Required Readings:**
LB: Chapter 1: Bivariate Regression: Fitting a Straight Line (*p. 1 – 22*)

MJ: Chapter 3: Simple Bivariate Regression (*p. 45 – 54 ONLY*)

**Sample papers**
- Read sample description sections and explore the descriptive Tables, usually Table 1
  - Nepomnyaschy & Waldfogel, 2007
  - Gold & Nepomnyaschy, 2018
  - O’Connor & Nepomnyaschy, 2019

**Suggested Readings:**
- SW: Chapter 4: Linear Regression w/One Regressor (*p. 107 – 122 ONLY*)

**Week 4: September 25, 2019**
Topics: Bivariate regression continued
- Interpreting bivariate regression coefficients
- Hypothesis Testing
- Predictions w/bivariate regression
**Required Readings:**

MJ: Chapter 3: Simple Bivariate Regression (Rest of chapter: p. 54 – 65 ONLY)


*Sample papers: TBA*
- Read Methods section: Data, Sample, Measures, Analytic Strategy

**Suggested Readings:**
Studenmund, Chapter 5: Hypothesis Testing (p. 121 – 150).

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**Week 5: October 2, 2019**

**Topic:** Regression w/Dummy Variables & Multiple Regression
- Binary & categorical independent variables (dummy variables)
- Introduction to multiple regression

**HW #2 Assigned: Multiple Regression, Due: Week 9**

**Required Readings:**
MJ: Chapter 5: Regression with Dummy Variables

MJ: Chapter 4: Multiple Regression

LB: Chapter 3: Multiple Regression (p. 55 – 74).


*Sample papers: TBA*

**Suggested Readings:**
Hardy, M. 1993. *Regression with Dummy Variables*, Chapters 1, 2, and 3 (p. 1 – 28)
Week 6: October 9, 2019

Topic: Multiple Regression Continued
- Regression Assumptions
- Nonlinear Relationships
- Rescaling and transforming variables for interpretation
- Magnitude of effects

HOMEWORK #1: DUE

Required Readings
MJ, Chapter 7: Linear Regression Assumptions & Diagnostics
Gelman & Hill. Chapter 4: Linear Models: Before and After Fitting the Model (transformation) (p. 53-74).

Sample papers: TBA

Suggested Readings
Studenmund, Chapter 4: The Classical Model (p. 93 – 110).
Gordon, Chapter 12: Nonlinear Relationships (p. 434 – 456)
Gordon, Chapter 14: Outliers, Heteroskedasticity, and Multicollinearity (p. 481-520).

Week 7: October 16, 2019

Topic: Multiple Regression continued
- Regression Diagnostics
- Model specification
- Mediation & Confounding
- Presenting Findings (predictions)

Required Readings:
(LB) Lewis-Beck. Chapter 4: Multiple Regression: Special Topics (p. 75-95)
Gordon, Chapter 13: Indirect Effects and Omitted Variable Bias (p. 461 – 480)
Miller, Chapter 9: Quantitative Comparisons for Multivariate Models (p. 193 – 199 ONLY)
Miller, Chapter 10: The Goldilocks Problem in Multivariate Regression (p. 211 – 229)
Studenmund, Chapter 11: Running Your Own Regression Project, Practical Advice for Your Project (p. 383 – 393).
Sample Papers: TBA

Week 8: October 23, 2019
Topic: Introduction to Interaction Effects (moderation)

HW #3 Assigned: Interaction effects w/continuous outcomes, DUE: Week 12

Required Readings over next 3 weeks (week 8, 9, 10)
MJ: Chapter 6: Interaction/Moderation Effects Using Regression
Miller, Chapter 16: Writing About Interactions (p. 339 – 365).

Sample papers: TBA

Supplementary Reading:
Jaccard & Turrisi, Interaction Effects in Multiple Regression: Chapters 1 and 2, (p. 1 - 43). very helpful – strongly recommended
Gordon, Chapter 11: Interaction Effects.

Week 9: October 30, 2019
Topic: Interaction Effects cont’d

HOMEWORK #2 DUE

Sample papers: TBA

Week 10: November 6, 2019
Topic: Interaction effects (cont’d)

Sample papers: TBA

Week 11: November 13, 2019
Topic: Intro to Binary Outcomes
  • Dichotomous dependent variables
• frequency tables
• linear probability models

Homework #4 Assigned: Binary Outcomes, Due: Week 14

Required Readings for next 2 weeks (weeks 11, 12):
Gordon, Chapter 16: Dichotomous Outcomes (p. 552 – 563).

SW: Chapter 11: Regression with a Binary Dependent Variable (p. 381-387 ONLY)

Wooldridge, Chapter 7: Multiple Regression Analysis with Qualitative Information (p. 252-257 ONLY)

Sample papers: TBA

Week 12: November, 20, 2019
Topic: Binary Outcomes

HOMEWORK #3 DUE

Sample Papers: TBA

THANKSGIVING BREAK – NO CLASS – NOVEMBER 27, 2019

Week 13: December 4, 2019
STUDENT PRESENTATIONS OF FINAL ASSIGNMENT

Week 14: December 11, 2019
STUDENT PRESENTATIONS OF FINAL ASSIGNMENT

Week 15: December 18, 2019
Topic: Intro to Advanced Topics & Wrap Up

Final Assignment Due – December 20, 2019