1 Course Description

This class is about knowing things. Specifically, it is less about what we know than how we know it. As intelligent beings, we tend to make generalizations about our world to help us better understand our surroundings. We generally attempt to recognize patterns based on our own experience or the experience of others. When we’re dealing with the ordinary knowledge of everyday life, these methods usually suffice. For more complex issues, however, our normal processing power is not sufficient to consider the innumerable potential causes, effects, and complicating factors. Instead, we must utilize a more precise and systematic way of organizing and evaluating all of the relevant information.

It is this set of research methods that is the subject of the course. By rigorously subjecting questions and claims to empirical verification, we can better understand how the world works. We will begin with an introduction to the logic and tools of econometrics. After this, we will learn to understand and use the main workhorse of social science research: the regression analysis. We will investigate the usefulness of the tool as well as its statistical and practical limitations. Finally, we will explore more advanced statistical techniques that allow us to tailor more intelligently our method to our research question. Throughout, we will learn to analyze data using computer software (Stata, or R if you want a challenge). Additionally, we will learn how to communicate these findings, avoiding the pitfalls of “bad statistics.”

In this course, we will be reading (and re-reading) a lot. We will be engaging some of the mathematical foundations of the linear regression model. To avoid this is to resort to relying upon “magical thinking,” something that is not among the accepted tools of social science. Although you will generally not be required to derive your own mathematical proofs of the concepts presented here, you will need to understand how these models work on the basis of more than just intuition. Of course, reading about regression models is not enough. Instead, we need to learn how to do this kind of research. As such, this course also requires a good deal of hands-on work. This is based upon the assumption that learning by doing is the best way to build deep understanding and sustainable mastery of these techniques.

This course builds on the content of the prerequisite course, PSC 701. It assumes basic competency in math, including an understanding of linear algebra, matrix notation, rudimentary calculus, and probability theory. If these areas are not your strong suit, I highly recommend brushing up on these skills.
2 Objectives

1. Know the basic techniques of quantitative social science research;
2. Understand the logic of these techniques, as well as the assumptions upon which they rely;
3. Apply these techniques using a statistical software package (Stata or R);
4. Interpret the results of quantitative analysis in substantive terms;
5. Assess the existing scholarly literature in your field for its methodological rigor; and
6. Design and execute an replication & extension of existing research using advanced quantitative research techniques.

3 Course Materials

3.1 Required Resources


Additional readings will be available on WebCampus.

3.2 Recommended Resources


3.3 Software Packages

For this course, we will be using software programs to conduct quantitative analyses. Most students choose to use Stata for this. Stata is relatively user-friendly, and many students are familiar with it from their PSC 701 course. If you choose to use Stata, you will need access to a copy of Stata 13 or 14 (IC, SE, or MP). You can purchase access to this software by visiting: http://www.stata.com/order/new/edu/gradplans/student-pricing/. Alternatively, you may choose to do your analyses in R. R is a very powerful and flexible program, and it’s also free. It is a little bit trickier to learn, but many students recognize that the effort is well worth it in the long run. If you choose to use R, you will probably want to use the RStudio graphical user interface. UNLV graduate students have access to powerful tutorials to get you up and running in R and RStudio through the Lynda portal (oit.unlv.edu/lynda). I also highly recommend the DataCamp tutorials, especially the free “Introduction to R” course (www.datacamp.com/courses/free-introduction-to-r).
I also strongly recommend that students familiarize themselves with the LaTeX or rmarkdown programming languages for the production of documents. At the beginning of the semester, I will send all students an invitation to ShareLaTeX, which is a free, web-based LaTeX editor. This language is especially useful for those students using R, since you can use the knitr package to conduct your analyses right in your document. If you’re familiar with html programming, LaTeX won’t be too terribly difficult to learn. An even easier option is the rmarkdown language, which allows you to incorporate R code, LaTeX equations, and formatted text into an original source document to be rendered into html, pdf, or Word documents.

4 Course Requirements

4.1 Homework Assignments. 50 pts. each, up to 400 pts. total

Much of this course focuses on the practical application of statistical techniques. Because of this, it is absolutely imperative that you practice these skills as you learn them. To assist you in this case, there will be a series of twelve weekly assignments for you to complete. These assignments will require the use of Stata (or R). Assignments are due before class via WebCampus. Details will be announced during the first class meeting. Please note that your score for the homework component is points-based. There are a total of 600 homework points available over the course of the term. Any points in excess of the 400 maximum will not be counted toward your final grade.

Please note that your homework assignments will be assessed by our course TA. These assessments will be according to a detailed rubric created by the professor. The TA will have only partial access to the WebCampus records, such that they will grade all of the assignments anonymously. As such, you will need to upload your homework assignments to WebCampus without your name or other identifying information attached to the file.

4.2 Replication & Extension Study. 400 pts.

As social scientists, much of our work consists of devising methodologically sound ways of testing research hypotheses. Our discipline is in the midst of an important discussion about replication and reproducibility in research. We can see this in the current debate over the DA-RT initiative, as well as the fallout from the LaCour scandal. This semester, we will be entering into this debate. We will spend time reading and thinking critically about this issue. We will also be conducting a replication & extension of an existing piece of research. You should aim to choose the study you’ll replicate early in the semester. To keep you on track, portions of this project will be due at various points throughout the semester. The final draft of your paper is due via the WebCampus link at 5 pm on May 2. You will present your paper in the style of a conference presentation during the final exam period, which is May 9. Although the exam period is from 6-8 pm, we will go ahead and meet at the regular time (5:30 pm). Details will be announced during the first class meeting.

Please note that I follow the Academic Misconduct policy (found below in the University Policies section). I report every instance of plagiarism that I find. I reserve the right to exercise my discretion as to the severity of the punishment I suggest to the Office of Student Conduct, as per the rules laid out in the Student Academic Misconduct Policy. I take this very seriously. I interpret plagiarism more broadly than simply word-for-word adoption of another author’s text; I consider the unattributed use of ideas, literature review, or paper structure to be in violation of the Policy, as well. Given that you will be conducting replication studies, you must be very diligent about making sure that the resulting paper is your original work.
4.3 Seminar Contribution. 200 pts.

It is probably no surprise to you that this course will require a lot of reading. I have done my best to organize the readings to make the workload manageable. I have divided the readings into three different categories. The first is the required reading. The required readings are listed first and with the tag “Required” in Section 5.2. These readings must be read carefully before the class period. Although many of the required readings cover the same material, it is important to see this material presented in a few different ways in order to truly absorb it. The second category of readings is labeled “In Action” in Section 5.2. These readings provide you an opportunity to see some of the relevant concepts at work. You may choose to skim these readings, but make sure that you read the methodology section very carefully. You’ll need to learn how the methods are used and be exposed to the way the results are communicated. The final category of readings are “Recommended.” These readings provide you the information you need to delve deeper into the concepts. You may want to spend some time reading the recommended readings on topics that are particularly relevant to your replication study or your own research interests.

To earn points for your contribution to the seminar, you need to come to all course meetings prepared to discuss the week’s readings. The course is a seminar, and it only works if students attend and are prepared to engage the course material. Attendance is required. I expect that all assigned reading will be completed prior to class. Repeated absences and/or failure to prepare for class will result in a significant reduction to the seminar contribution component of the grade. In addition, I expect that students will observe a baseline level of socially acceptable behavior in the seminar. Students are not allowed to record any portion of these seminars without express permission of the professor.

4.4 A Note on Grading

There is a norm in graduate school of grade inflation. Typically, grades for graduate seminars range from an A to a B+. Grades of B or below are rare, and are assigned only in cases of near total student dereliction. Many instructors of graduate courses give a grade of B- or C+ to all failing students, regardless how badly they have failed. However, in a course as critical to your graduate school success as this one, following this tradition may end up giving students a false sense of their performance and potential. As such, I will assign the full range of grades in this course. The cut-offs for final grades are as follows:

<table>
<thead>
<tr>
<th>Table 1: Points Required for Letter Grades</th>
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<tbody>
<tr>
<td>Passing Grades</td>
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<tr>
<td>A  940-1000</td>
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<tr>
<td>A- 900-939</td>
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<tr>
<td>B+ 870-899</td>
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4
5 Course Schedule

5.1 Brief Overview of Course

Table 2: Tentative Schedule of Topics: Overview

<table>
<thead>
<tr>
<th>Session</th>
<th>Date</th>
<th>Topic</th>
<th>Highlights</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1/25</td>
<td>Introduction and Review</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>2/1</td>
<td>Replication &amp; Political Science</td>
<td>HW1</td>
</tr>
<tr>
<td>3</td>
<td>2/8</td>
<td>The Basics of OLS</td>
<td>HW2</td>
</tr>
<tr>
<td>4</td>
<td>2/22</td>
<td>Dummies &amp; Simple Interactions</td>
<td>HW3; Targets</td>
</tr>
<tr>
<td>5</td>
<td>2/29</td>
<td>Measurement Error</td>
<td>HW4</td>
</tr>
<tr>
<td>6</td>
<td>3/7</td>
<td>Specification Issues</td>
<td>HW5; Data</td>
</tr>
<tr>
<td>7</td>
<td>3/14</td>
<td>Multicollinearity &amp; Nonlinearity</td>
<td>HW6</td>
</tr>
<tr>
<td>8</td>
<td>3/28</td>
<td>Outliers &amp; Leverage</td>
<td>HW7</td>
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<td>9</td>
<td>4/4</td>
<td>Heteroskedasticity &amp; Autocorrelation</td>
<td>HW8; Replication</td>
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<tr>
<td>10</td>
<td>4/11</td>
<td>Simultaneity &amp; Dynamic Models</td>
<td>HW9</td>
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<tr>
<td>11</td>
<td>4/18</td>
<td>Robust Regression</td>
<td>HW10</td>
</tr>
<tr>
<td>12</td>
<td>4/25</td>
<td>Missing Data</td>
<td>HW11</td>
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<tr>
<td>13</td>
<td>5/2</td>
<td>Exploring Advanced Models</td>
<td>HW12; Paper</td>
</tr>
<tr>
<td>14</td>
<td>5/9</td>
<td>Mini-Conference</td>
<td>Presentation; Discussant</td>
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5.2 Detailed Schedule of Topics and Readings

1. January 25: Introduction and Review. During this session, we will review the basics of data organization and visualization. We will also become acquainted with Stata, R, \LaTeX, and \texttt{rmarkdown}. Before class, read:

- **Required**: Fox Ch. 1-4
- **Required**: Acoc Ch. 1-7 (review)
- **Required**: The Syllabus
- **Recommended**: Relevant \LaTeX, R, and/or \texttt{rmarkdown} tutorials.

2. February 1: Replication & Political Science. In this session, we will be discussing the role of reproducibility and replication in political science. We will learn about the reasons to pursue these goals, how to conceptualize and conduct replication studies, and some recent controversies about the topic in the discipline. Homework 1 is due. Before class, read:


• **Required:** Dialogue on DA-RT Website (especially Pepinsky’s “The DA-RT Petition”). [www.dialogueondart.org](http://www.dialogueondart.org).


3. **February 8:** *The Basics of OLS.* Building on the introductory statistics from PSC 701, we will introduce the logic and method of ordinary least squares regression analysis. Homework 2 is due. Before class, read:

• **Required:** Fox Ch. 5-6.3

• **Required:** Gujarati Ch. 1

• **Required:** Acock Ch. 10.1-10.2 (also review Ch. 8-9)


• **Recommended:** King Ch. 4 (especially section 4.3)


• **Recommended:** For a deeper understanding of OLS, also read Fox Ch. 9-10

4. **February 22:** *Dummy Variables & Simple Interactions.* This session introduces the use of “qualitative” or “factor” independent variables in OLS. We will learn how to use linear regression to investigate additional non-linear (in the variables) hypotheses. In addition, we will learn how to generate and interpret interactive terms. Homework 3 is due, as is your list of potential replication targets. Before class, read:

• **Required:** Fox Ch. 7

• **Required:** Gujarati Ch. 3

• **Required:** Acock Ch. 10.9-10.11


5. **February 29**: *Measurement Error*. Here, we will talk about the importance of measurement. We will learn how to execute simple factor analysis techniques to identify and address measurement error. Homework 4 is due. Before class, read:

- **Recommended**: For another (and prettier) way to deal with interactive terms, read Acock Ch. 14

6. **March 7**: *Specification Issues*. We will address some introductory issues of model specification, including omitted variable bias, overspecification, and nonadditivity. Homework 5 is due, as is your replication data assignment. Before class, read:

- **Required**: Fox Ch. 6.4
- **Required**: Gujarati Ch. 7.5
- **Required**: Acock Ch. 12

7. **March 14**: *Multicollinearity & Nonlinearity*. In this class, we will talk about the very commonly misunderstood issue of multicollinearity. We will learn to diagnose multicollinearity, and we will discuss the implications of various degrees of the problem. Homework 6 is due. Before class, read:

- **Required**: Fox Ch. 4, 12.3-12.6, 13, 17
- **Required**: Gujarati Ch. 2, 4, 7.4
- **Required**: Acock Ch. 10.5, 10.7.3, 10.12


8. **March 28:** *Outliers, Leverage, and Influential Data*. Sometimes, our results can be heavily influenced by a few extreme or unusual cases. We will learn how to identify problematic outliers, and we will introduce a few different ways to manage them. Homework 7 is due. Before class, read:

• **Required:** Fox Ch. 11

• **Required:** Gujarati Ch. 7.6

• **Required:** Acock Ch. 10.7.1-10.7.2


9. **April 4:** *Heteroscedasticity & Autocorrelation*. In this session, we will be diagnosing the error term for a number of problematic characteristics. We will discuss the causes and implications of these problems, along with various strategies for dealing with them. Homework 8 is due, as is your replication assignment. Before class, read:

• **Required:** Fox Ch. 12

• **Required:** Gujarati Ch. 5

• **Required:** Acock Ch. 10.6, 10.8


10. **April 11:** *Simultaneity & Dynamic Models*. Here, we will discuss more complex issues of model specification. We will look at what happens when the dependent variable has an impact on the value of one or more of the independent variables. We will learn how to use simultaneous equation models and instrumental variables to remedy this problem. Homework 9 is due. Before class, read:

• **Required:** Gujarati Ch. 7.9-7.10 & 19
11. April 18: **Robust Regression.** In this session, we will discuss the logic of robust regression. We will learn how it is different from OLS, and we will weigh the costs and benefits of using it in a variety of situations. Homework 10 is due. Before class, read:

- **Required:** Acock 10.1-10.3
- **Required:** Fox Ch. 15, 19

12. April 25: **Missing Data.** As social scientists, we will come into missing data problems for a wide variety of reasons. Here, we will discuss some strategies for coping with missing data, including multiple imputation techniques. Homework 11 is due. Before class, read:

- **Required:** Fox Ch. 20
- **Required:** Acock Ch. 13

13. May 2: **Exploring Advanced Models.** In this session, we will introduce a number of other models that deal with dependent variables that violate our regression assumptions. We will briefly explore how the logic of the linear regression can be generalized to produce models of limited dependent variables. We will also introduce the different kinds of time-dependent data analyses. We will focus mostly on panel data, but we will also touch on how to analyze data with longer time horizons for patterns of change. Homework 12 is due, as is your final paper. Before class, read:

- **Required:** Acock Ch. 11
- **Required:** Fox Ch. 14, 22
- **Required:** Gujarati Ch. 8-10, 17


• **Recommended:** King. 1998. *Unifying Political Methodology*. 978-0-472-08554-5. Part II.


• **Recommended:** For more limited dependent variable models, read Fox Ch. 15 and Gujarati ch. 11, 12

• **Recommended:** For more on time series, read Fox Ch. 16 and Gujarati Ch. 6, 13-15, 18-19

14. **May 9: Replication & Extension Presentations.** Your discussant comments will be due in class, and you will present the results of your own research.


6 **University Policies**

6.1 **Academic Misconduct**

Academic integrity is a legitimate concern for every member of the campus community; all share in upholding the fundamental values of honesty, trust, respect, fairness, responsibility and professionalism. By choosing to join the UNLV community, students accept the expectations of the Student Academic Misconduct Policy and are encouraged when faced with choices to always take the ethical path. Students enrolling in UNLV assume the obligation to conduct themselves in a manner compatible with UNLV’s function as an educational institution. An example of academic misconduct is plagiarism. Plagiarism is using the words or ideas of another, from the Internet or any source, without proper citation of the sources. See the Student Academic Misconduct Policy (approved December 9, 2005) located at: [http://studentconduct.unlv.edu/misconduct/policy.html](http://studentconduct.unlv.edu/misconduct/policy.html).

6.2 **Copyright**

The University requires all members of the University Community to familiarize themselves with and to follow copyright and fair use requirements. **You are individually and solely responsible for violations of copyright and fair use laws.** The university will neither protect nor defend you nor assume any responsibility for employee or student violations of fair use laws. Violations of copyright laws could subject you to federal and state civil penalties and criminal liability, as well as disciplinary action under University policies. Additional information can be found at: [http://www.unlv.edu/provost/copyright](http://www.unlv.edu/provost/copyright).

6.3 **Disability Resource Center (DRC)**

The UNLV Disability Resource Center (SSC-A 143, [http://drc.unlv.edu/](http://drc.unlv.edu/), 702-895-0866) provides resources for students with disabilities. If you feel that you have a disability, please make an appointment with a Disabilities Specialist at the DRC to discuss what options may be available.
to you. If you are registered with the UNLV Disability Resource Center, bring your Academic Accommodation Plan from the DRC to the instructor during office hours so that you may work together to develop strategies for implementing the accommodations to meet both your needs and the requirements of the course. Any information you provide is private and will be treated as such. To maintain the confidentiality of your request, please do not approach the instructor in front of others to discuss your accommodation needs.

6.4 Religious Holidays Policy

Any student missing class quizzes, examinations, or any other class or lab work because of observance of religious holidays shall be given an opportunity during that semester to make up missed work. The make-up will apply to the religious holiday absence only. It shall be the responsibility of the student to notify the instructor no later than the end of the first two weeks of classes, January 29, 2016, of his or her intention to participate in religious holidays which do not fall on state holidays or periods of class recess. For additional information, please visit: http://catalog.unlv.edu/content.php?catoid=6&navoid=531.

6.5 Incomplete Grades

The grade of I–Incomplete–can be granted when a student has satisfactorily completed three-fourths of course work for that semester/session but for reason(s) beyond the student’s control, and acceptable to the instructor, cannot complete the last part of the course, and the instructor believes that the student can finish the course without repeating it. The incomplete work must be made up before the end of the following regular semester for undergraduate courses. Graduate students receiving “I” grades in 500-, 600-, or 700-level courses have up to one calendar year to complete the work, at the discretion of the instructor. If course requirements are not completed within the time indicated, a grade of F will be recorded and the GPA will be adjusted accordingly. Students who are fulfilling an Incomplete do not register for the course but make individual arrangements with the instructor who assigned the I grade.

6.6 Tutoring

The Academic Success Center (ASC) provides tutoring and academic assistance for all UNLV students taking UNLV courses. Students are encouraged to stop by the ASC to learn more about subjects offered, tutoring times and other academic resources. The ASC is located across from the Student Services Complex (SSC). Students may learn more about tutoring services by calling 702-895-3177 or visiting the tutoring web site at: http://academicsuccess.unlv.edu/tutoring/.

6.7 UNLV Writing Center

One-on-one or small group assistance with writing is available free of charge to UNLV students at the Writing Center, located in CDC-3-301. Although walk-in consultations are sometimes available, students with appointments will receive priority assistance. Appointments may be made in person or by calling 702-895-3908. The student’s Rebel ID Card, a copy of the assignment (if possible), and two copies of any writing to be reviewed are requested for the consultation. More information can be found at: http://writingcenter.unlv.edu.
6.8 Rebelmail/University E-mail

By policy, faculty and staff should e-mail students' Rebelmail accounts only. Rebelmail is UNLV's official e-mail system for students. It is one of the primary ways students receive official university communication such as information about deadlines, major campus events, and announcements. All UNLV students receive a Rebelmail account after they have been admitted to the university. Students' e-mail prefixes are listed on class rosters. The suffix is always @unlv.nevada.edu. [Emailing within WebCampus is NOT acceptable for Dr. Gill's courses. -RG]