Data, Models, and Decisions II (PAD 505)
(A.K.A. Introductory Statistics)

Fall, 2016
Department of Public Administration and Policy
Rockefeller College of Public Affairs and Policy
University at Albany (SUNY)

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I. Overview:

Statistics are ubiquitous in our daily lives and are essential for achieving the holy grail of “evidence-informed policy” and yet all too often the interpretation of research results are made unnecessarily inaccessible to critically minded audiences through an over-emphasis on the mathematics of statistics versus the practice of doing statistical analysis. The goal of this course is to develop a basic level of statistical literacy that will allow students to critically examine research evidence on important policy and public administration issues. This includes making students better consumers of news stories that cite empirical studies, reports put out by think tanks and other sources of policy analysis and original research studies published in academic journals.

The course is designed as an introduction to the use of descriptive and inferential statistics in policy analysis and management. Students are not expected to have studied statistics previously, but basic competency in mathematics and algebra is assumed. Students who wish for a more mathematically oriented introduction to statistics primarily through probability theory are encouraged to investigate appropriate courses in the Department of Mathematics and Statistics.

Topics introduced in this course are covered under four general sections, each receiving approximately equal treatment: summarizing, presenting and cleaning data; sampling theory; study design and advanced data analysis. The approach taken to these topics will be more oriented to application in management and policy making than to an exploration of the theoretical foundations of the field. The emphasis of the class will be on how to actually do statistics in real life and correctly interpret results. In this regard, the course will require a great deal of hands on use of computer software, but also less math (for those of you that are a bit math phobic).

Several of the key objectives to be achieved through this course include:

1) Developing an appreciation of the importance of statistics in contemporary public inquiry,
2) Gaining increased sophistication as a statistical "consumer" who understands the strengths
and limitations of statistical analysis, and
3) Viewing key elements of research design from an administrative perspective in which the
costs and benefits of alternative data gathering options are considered.

II. Textbook and Course Materials

Required Textbook:
This is an expensive textbook, but used copies may be available on Amazon or other websites for
very cheap.

Supplementary readings will be posted on Blackboard. Be sure to check Blackboard regularly as
supplementary readings will likely be updated as the semester progresses.

Software: STATA 13 or 14

You will need to use both STATA to do homework assignments, projects and exams. You can
purchase a student version of STATA here: http://www.stata.com/order/new/edu/gradplans/student-
pricing/. Alternatively, you can commit to completing all assignments in the Computer Lab and
not buy Stata.

You will notice that there are several Stata plans available. The cheapest plan is a 6-month
license of “small Stata” for $34. The problem with “small Stata” is that the maximum
observations it allows is 1,200 and up to 99 variables. We will be working with datasets
throughout the semester that are bigger than this- have more observations and variables than this
version allows. Your midterm and final will involve using datasets that are larger than this.
If you choose to buy Small Stata, you will likely still need to complete assignments on the
computers at school. **I would strongly recommend buying Stata/IC for the 6-month license for
$75 if you want to be able to complete course assignments without going to the computer lab.**
If you think you will be using Stata a lot in future work, you may want to buy a longer license or
even go with Stata/SE (large Stata) if you think you will be doing research with “big Data” in the
future. These prices are still much better at the student rate than they would be if you were not a
student.

Note: Most PAD faculty, including myself, use Stata in our research (others use R or SAS) and
faculty are always looking for research assistants with data skills.

Suggested Supplementary Textbook for STATA:

### III. Course Schedule

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
<th>Textbook</th>
<th>Assignments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 8/29/16</td>
<td>Why We Should Care about Statistics</td>
<td>In-class reading assignment; individual and group work</td>
<td>Complete course pre-survey</td>
</tr>
<tr>
<td>9/5/16</td>
<td><strong>No class, Labor Day</strong></td>
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<tr>
<td><strong>Unit 1: Summarizing, Presenting and Cleaning Data</strong></td>
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<tr>
<td>9/12/16</td>
<td>Descriptive Statistics: Types of Variables, Measures of Central Tendency and Dispersion</td>
<td>Textbook chapters 2, 5 &amp; 6;</td>
<td>Assign 1 Quiz 1</td>
</tr>
<tr>
<td>2 9/19/16</td>
<td>Further Data Cleaning &amp; Summary: Frequency Distributions, Cross-Tabulations &amp; Measures of Association</td>
<td>Textbook chapters 4, 15, 16</td>
<td>Assign 2 Quiz 2</td>
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<tr>
<td><strong>Unit 2: Sampling Theory</strong></td>
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<tr>
<td>3 9/26/16</td>
<td>From Populations to Samples: Sampling design and theory</td>
<td>Readings: Fowler chapters 1-5 (Blackboard)</td>
<td>Assign 3 Quiz 3</td>
</tr>
<tr>
<td>4 10/3/16</td>
<td><strong>No class, Rosh Hashanah</strong></td>
<td></td>
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<tr>
<td>5 10/10/16</td>
<td>Inference and Hypothesis Testing</td>
<td>Textbook ch 11 &amp; 12</td>
<td>Assign 4 Quiz 4</td>
</tr>
<tr>
<td>6 10/17/16</td>
<td>Confidence intervals and significance testing for samples: t-test, etc. (How to compare sample stats to a population)</td>
<td>Textbook chapters 13 &amp; 14</td>
<td>Assign 5 Quiz 5</td>
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<tr>
<td>7 10/24/16</td>
<td><strong>Midterm exam</strong></td>
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<tr>
<td><strong>Unit 3: Study Design</strong></td>
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<tr>
<td>8 10/31/16</td>
<td><em><strong>HALLOWEEN</strong></em> Special Online Unit in Lieu of Class</td>
<td>TBD</td>
<td>Assign 6 Quiz 6</td>
</tr>
<tr>
<td>9 11/7/16</td>
<td>Study Design: Surveys versus Experimental Designs; Correlation versus Causation; Internal vs External Validity</td>
<td>Textbook ch.3, Research design Chapter 1, What works in development and accompanying blog post (Blackboard)</td>
<td>Assign 7 Quiz 7</td>
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<tr>
<td><strong>Unit 4: Advanced Data Analysis</strong></td>
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<tr>
<td>10 11/14/16</td>
<td>Scatterplots, correlation, assessing causal relationships</td>
<td>Textbook Chapter 17</td>
<td>Assign 8 Quiz 8</td>
</tr>
<tr>
<td>11 11/21/16</td>
<td>Simple linear regression &amp; multiple regression</td>
<td>Textbook Chapter 18, 19, 21</td>
<td>Assign 9 Quiz 9</td>
</tr>
<tr>
<td>12 11/28/16</td>
<td>Transforming data and data cleaning for regression; creating compound measures</td>
<td>Textbook Chapter 23</td>
<td>Assign 10 Quiz 10</td>
</tr>
<tr>
<td>13 12/5/16</td>
<td>Different types of regression (e.g., logistic; time-series)</td>
<td>Textbook Chapter 22</td>
<td>None</td>
</tr>
<tr>
<td>14 12/12/16</td>
<td><strong>Final project presentations</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12/16/16</td>
<td><strong>Final Project due</strong></td>
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</table>
III. Course Requirements:

To allow adequate class time to discuss critical and difficult issues, you must read the required chapters prior to class. Take notes about the parts you have difficulty understanding. Please check your email account and the Blackboard site at least once a week for important updates on class materials.

You are expected to spend at least eight hours each week on this course besides in-class learning. These eight hours should be spent to review textbook chapters, class notes, solutions to example questions, and then finish homework. As part of the course learning, you should pay attention to some policy studies published in newspapers. You may be asked to discuss some policy study examples in class. Some useful information sources are *New York Times* and *Albany Time Union*. As you are reading related articles on a certain policy study, pay attention to their data sources, data collection methods, analytical methodology, results, and their arguments based on the results.

*Individual and Group Work.* You will be divided into permanent groups throughout the semester and in most classes you will be asked to perform a series of group tasks in addition to individual tasks. This includes taking weekly in-class quizzes individually and in groups. In order to minimize the “free-rider” problem inherent in group work, you will have an opportunity midway through and at the end of the semester to assess the contribution of each of your group members. See more details below under Grading and Assignments.

III. Grading and Assignments:

1. **Weekly in-class quizzes (10 points each, 100 points total; 50% individual grade, 50% group grade).** Part of your weekly participation grade will come from in-class quizzes on the readings that will be taken at the beginning of the class. There will be a quiz each week consisting of 2-4 questions unless otherwise specified. You will first take these quizzes individually and then as a group. Your individual grade will account for 50% and your group grade 50%. We will go over the answers in class that day. The goal of these quizzes is to encourage you to do the reading and come prepared to class. We hope that these quizzes will help you to be a better consumer of knowledge when you read and reinforce the main knowledge set we want you to take away from the course. **The lowest 4 quiz grades will be dropped.** This includes zeros that you might receive for an unexcused absence from class. If you arrive too late to reasonably complete the quiz, this will also count against you.

*Appeals process for quiz questions.* Much of the material we will cover is quite nuanced and many of the quiz questions will ask for the “best” answer. While there will always be an answer that the instructors deem to be the “best” or “correct” answer, sometimes students may feel strongly that the question was worded unclearly or deceptive in some way and that in fact another answer is the “better” answer. In these cases, teams can nominate questions to be struck from the quiz grades.
Below we detail the process:

- Teams must appeal in favor a specific answer, and must give reasons why that answer is as good or better than the 'correct' answer. Typically, the best appeal is when a team shows a part of the book which misled them, or point to an issue with the question's structure. [NOTE: The instructor has complete discretion in whether or not to accept an appeal and this will depend entirely on the cogency of your argument].

- If a team successfully appeals, than all members of that team who also selected the appeal answer also get credit. Team members who got it wrong by picking another answer get nothing. Other teams in the class also get nothing, and every team needs to appeal themselves. This is to prevent free-riding off others and to encourage individual team thinking effort.

- Individuals cannot appeal anything; only groups may appeal. This is so that individuals have an incentive to argue their points to their groups. If they want their individual answer to be available to appeal, they have to convince their group that it is a good answer (that even if it is wrong, it can be appealed successfully).

- The written appeal should be submitted to the instructor by email.

2. **Participation and attendance (30 points).** Participation and attendance account for 30 points of the grade. Students are expected to attend each class on a timely basis, so that they will benefit maximally from the class lectures, class exercises, and class discussion. Unexcused absences will result in a reduced final course grade. We will assess attendance through the weekly quizzes. In addition, participation will be evaluated by your peers.

3. **Homework (10 points each, 100 points total).** Throughout the semester, 10 homework assignments will be given to students. Previous experience proves that weekly practice is the best way to learn analytical skills. Assignments will be graded based on correctness of the results and your “calculation process” using the statistical package, including your do files where relevant. Please do include the calculation process so you will get partial credits even if the result is not correct. Please combine your work to a single Microsoft Word file for submission.

   Assignments should be submitted ONLY through Blackboard. Each assignment is due BEFORE class on the due day. Please make sure that you submit your assignments on time. Late assignments will be subject to penalty.

4. **Midterm and final projects (50 points each).** The midterm and final will consist of an assignment to be completed using the Stata software package. The goal of this assignment is for you to get hands on experience completing a data-driven research project. The midterm will be an assignment that you will need to complete “for your employer,” whereas the final project will grant you more discretion in coming up with the research question to investigate. The data will be provided by the instructor for each.

5. **Grade:** Final grades will be based on class attendance and participation, homework assignments, and exams. Maximum points for each part are as follows:
Weekly Quizzes on Readings 100 points (10*10 points)
   Individual Grade 50 points
   Group Grade 50 points
Participation and discussion 30 points
   Individual Grade 15 points
   Group Grade 15 points
Weekly assignments 100 points (10*10 points)
Midterm project 50 points
Final project 50 points
Total 330 points

Final letter grades will be assigned as followed:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Minimum Points Earned</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>314</td>
<td>95%</td>
</tr>
<tr>
<td>A-</td>
<td>297</td>
<td>90%</td>
</tr>
<tr>
<td>B+</td>
<td>287</td>
<td>87%</td>
</tr>
<tr>
<td>B</td>
<td>274</td>
<td>83%</td>
</tr>
<tr>
<td>B-</td>
<td>264</td>
<td>80%</td>
</tr>
<tr>
<td>C+</td>
<td>254</td>
<td>77%</td>
</tr>
<tr>
<td>C</td>
<td>241</td>
<td>73%</td>
</tr>
<tr>
<td>C-</td>
<td>231</td>
<td>70%</td>
</tr>
<tr>
<td>D+</td>
<td>221</td>
<td>67%</td>
</tr>
<tr>
<td>D</td>
<td>208</td>
<td>63%</td>
</tr>
<tr>
<td>D-</td>
<td>198</td>
<td>60%</td>
</tr>
<tr>
<td>E</td>
<td>195</td>
<td>59% and below</td>
</tr>
</tbody>
</table>

VI. Other policies

Any form of academic dishonesty will not be tolerated. Please refer to University at Albany’s Academic Code at: [http://www.albany.edu/content_images/AcademicIntegrity.pdf](http://www.albany.edu/content_images/AcademicIntegrity.pdf) for the definition of academic dishonesty. Ignorance of these policies will not excuse dishonest conduct. Violations of these standards will result in one of the following penalties or some variant: reduction in the grade for the assignment, failure of the assignment, failure of the course, or expulsion. In all cases, a Violation of Academic Integrity Report will be submitted to the Dean of Graduate Studies to be placed in your university file, with copies provided to you, the department head, and the Dean of Rockefeller College.

Students may appeal a grade on a specific assignment within two weeks of the assignment being returned. To submit an appeal, the student should return the original graded assignment and a letter/memo outlining why you think the grade should be changed. Appeals
must be submitted on paper, typed-written. In the appeal, students must identify 1) the specific issue you believe should be reconsidered and 2) evidence from assignment instructions, assigned readings, lectures, or other materials that would indicate your original submission is worthy of a higher grade. Be aware that your grade may go up, down, or remain the same as a result of your appeal.

Seeking past homework or past exam answers from any previous student is prohibited without my expressed, written permission. I will treat such behavior as serious academic misconduct by both the current and past student.

Students with needs consistent with the Americans with Disability Act should inform the instructor during the first week of class so that reasonable accommodations can be made.

Cellphones should only be used in case of emergencies. You can use computer, laptop or tablets only for notes-taking, reading class materials, or doing in-class exercise.

If a midterm examination is missed (without prior approval), its weight in the final grade is added to the final examination. The intersession assignment for each week is due at the beginning of class in the following week. Late assignments will be accepted with a grade penalty of 10% for each passing day. The grade earned by each student does not depend in any way on the distribution of others' grades; there is no penalty for assisting and supporting other students in this course (excepting violations of the academic rules and regulations of this university).