

## PUAD 601 – Quantitative Methods for Policy Analysis I Fall 2011 Course Syllabus

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Class meetings: Tuesdays, 2:35-5:15 p.m.

### Course Overview

Whether they should or they shouldn't, numbers matter in policy. Analysts use numbers in objective, evidence-based research about whether policy interventions are successful. Advocates use numbers to support normative arguments about whether government should (or should not) provide particular services. PUAD 601 is the first course in a two-course sequence designed to teach you the quantitative methods that you need for a career in public policy.

We will begin with an overview of research design and a quick review of descriptive statistics. We will then discuss probability theory and how policy researchers can use sampling to test hypotheses about policy issues. The last part of the course will cover the fundamentals of regression analysis.

Throughout the course we will use Stata software to examine policy data and generate visual depictions of our results. Students are not assumed to have a background in Stata, but those without much experience in spreadsheet programs like Excel may need assistance from tutors in the Social Science Research Lab.

### Required Materials

Healey, J. F. (2012). *Statistics: A tool for social research* (9<sup>th</sup> Ed.). ISBN 9781111186364.

*Note:* This book is in new edition and ridiculously expensive. You should feel free to purchase a used copy of the 8<sup>th</sup> edition instead. The chapter numbering is the same, and I have noted below where page numbers or section numbers differ.

A basic calculator

A jump drive for saving do-files and data sets

### Recommended Materials

A personal copy of Stata/IC (Version 12) for your home computer/laptop

*Note:* AU students are eligible to buy Stata/IC at a cost of \$98 for a one-year license or \$179 for a perpetual license, plus \$9.75 shipping. Visit the following link

(<http://www.stata.com/order/new/edu/gradplans/gp-direct.html>) to place your order. Note that you must use your american.edu email address in order to receive promotional pricing.

## Optional Materials

I have used the Healey textbook for several years now, and it appears to meet the needs of the vast majority of students. That said, some of you may find it to be more simplistic than you would like, and others may find it to be tough to understand. If you are in one of these two camps, I recommend that you pick up one of the following:

### For the Math-Phobes

Salkind, N. J. (2008). *Statistics for People Who (Think They) Hate Statistics* (3<sup>rd</sup> edition). Los Angeles: Sage Publications.

### For the Former Mathletes

Agresti, A., & Finley, B. (2009). *Statistical Methods for the Social Sciences* (4<sup>th</sup> edition). Upper Saddle River, NJ: Prentice-Hall.

The schedule below notes the chapters in these two books that correspond to each topic. Please let me know if you would like guidance on additional supplementary materials.

## Course Policies

### Academic Integrity

I will strictly enforce AU guidelines on academic integrity, which are explained in detail at <http://www.american.edu/academics/integrity/code.htm>. You are welcome to collaborate on homework assignments, but anything that you submit for credit should be in your own writing, and you are not allowed to work together on tests. Make sure that you appropriately cite materials used in your memo. *I will pursue the maximum sanction in all cases of academic dishonesty.*

### Accommodation and Academic Support

Please let me know as soon as possible if you require accommodation for physical or learning disabilities. The following offices can also assist you with needs in this area:

- Academic Support Center (<http://www.american.edu/ocl/asc/index.cfm>)
- Counseling Center (<http://www.american.edu/ocl/counseling/index.cfm>)
- Disability Support Services (<http://www.american.edu/ocl/dss/index.cfm>)

### Assignments and Due Dates

All homework assignments are due at the beginning of the class session for which they are assigned. *I do not accept late assignments.* If you are absent from class, it is still your responsibility to turn in your assignment electronically or through another student. The same holds for the policy memo, which is due at the beginning of class on **November 29**.

*Remember that all assignments are professional work products.* They should be typed and free of spelling and grammar errors. For homework assignments that involve calculations, you should type up your answers, but you are free to submit calculations in handwritten form on another sheet of paper. Please submit all assignments in hard copy, stapled. *I will not accept assignments that are handwritten, sent by email, or have not been proofread.* The only exception is that students who are absent may send their work by email.

### Communication

I use Blackboard to post announcements, grades, and course materials, and I use email to communicate with individual students. I will use your AU student email address. Please check this regularly or forward it to another account that you monitor frequently.

### Make-Up Tests and Incompletes

*I do not typically allow students to make up exams or earn a grade of Incomplete. You should attend class on days when exams are administered. If you are unable to do so, you may petition to take a make-up test, but this is granted only in exceptional circumstances. I may require documentation before giving a make-up test, and I may also choose to impose a grade penalty. Please let me know as soon as you see a problem developing so that we can consider the best means of addressing it. I am unlikely to allow a make-up test if you do not get in touch with me prior to the start of the test.*

### Tutoring

The Department of Public Administration and Policy provides tutoring for students enrolled in this course. The tutor for the fall semester is Ashley Roberts, and she is available on a first-come, first-served basis during the following times in Ward 307:

Monday, 3:00-8:00 p.m.  
Tuesday, 4:00-7:00 p.m.  
Wednesday, 12:30-2:30 p.m. and 8:15-10:15 p.m.  
Thursday, 1:30-4:30 p.m.

### Writing Assistance

This is not a writing class, but I have *very* high expectations for written work. You are responsible for producing assignments that are clear, well-organized, and free of grammatical errors. I strongly encourage students who struggle with writing to make an appointment with the AU Writing Center, particularly for the policy memo. More information is available online at <http://www.american.edu/cas/writing/>.

### **Evaluation**

I use the following grading system (*note*: I do *not* round decimals up to the next point):

<u>Numeric Grade</u>	<u>Letter</u>	<u>Assessment</u>
95 - 100	A	Exceeds my expectations for good MPP/MPA student work
90 - 94.99	A-	
88 - 89.99	B+	Meets my expectations for good MPP/MPA student work
83 - 87.99	B	
80 - 82.99	B-	Shows substantial deficiencies; minimally meets expectations
78 - 79.99	C+	
73 - 77.99	C	Work fails to meet minimum requirements and expectations
70 - 72.99	C-	
60 - 69.99	D	
0 - 59.99	F	

### **Assignments**

Homework assignments (10 @ 2% each)	20%
Policy memo	25%
Stata lab exercises	5%
Tests (2 @ 25% each)	50%

### Homework Assignments

I distribute homework assignments in class the week before they are due. You should bring completed assignments to class the following week in hard copy. I evaluate homework with a grade of “check” (full credit) or “check minus” (½ credit).

You will earn a “check” as long as you turn in a professional product and make a good-faith effort to produce correct answers. I do not penalize you for incorrect answers, as long as it is clear to me that you have read the relevant chapter and put time into the assignment. You will receive a “check minus” if you have made egregious mistakes that reflect an obvious lack of effort. You will not receive credit at all if your work is handwritten, has multiple grammar/spelling errors, or is emailed.

### Policy Memo

You will write a memo that investigates a policy issue that is of interest to you. You will use the methods that we cover in class to test hypotheses using one of the course data sets. The memo will count for 25% of the final course grade and is due in class on **November 29**. Details about the memo follow the syllabus in the appendix.

### Stata Lab Exercises

We will usually spend the second half of each class session in the SPA computer lab, where we will learn how to use Stata software. I will often give you exercises to complete in groups of 2-3 students. These will collectively count for 5% of the course grade, and I will evaluate them using the same system that I use for homework (check/check minus). *All lab exercises must be completed in class; you cannot make them up or do them at home for credit.*

### Tests

There will be two in-class tests. Each will count for 25% of the final grade and take one class session to complete. The midterm exam will be held in **October 18**, and the final exam will be held on **December 13**. Tests will involve both calculations and interpretation-oriented essay questions. We will review for each test during the preceding class session, and I am happy to meet with you one-on-one if you would like to review outside class hours.

### **Class Format**

Class will involve a combination of lecture and group work. At the beginning of each class, I will distribute a set of study questions that you should understand by the end of the session. We will take a 10-15 minute break at some point in the middle of class.

I call on students by name to answer questions during the lecture. It is important for you to follow along as we work through calculations, since I will call on you to help figure out the correct answer. I also frequently ask students to explain the logic behind the concepts that we discuss, and when we go over completed homework assignments, I ask students to explain their answers to the class.

I understand that being called upon to answer questions can create some anxiety, but there are three pedagogical reasons behind this format. First, there are many of you who rarely speak in class but have interesting insights that would benefit everybody. Calling on you directly allows everyone to hear what you have to say and leads to more diversity in the perspectives that we consider. Second, effective public speaking is a *bona fide occupational requirement*. You should consider this class a low-risk environment for working on your speaking skills. Third, the risk of being called upon to answer questions provides an incentive for everyone to put adequate preparation into the homework assignments and readings. If you have social anxiety issues that make this arrangement particularly daunting, please let me know. In my experience, students are anxious about this at first but get much more relaxed after a few class sessions.

Almost all class sessions will be split between a traditional classroom and a computer lab. Some of our sessions will require you to use Stata software to follow the lecture or complete problems in small groups. I try not to move too quickly through problems and examples, but please speak up if you fall behind or need Stata help. By the same token, please be patient with your classmates when they need more help than you do figuring out the software.

## Schedule of Topics

Please note that this is a *tentative* schedule. Depending on student needs, it is possible that readings and dates may have to be modified.

\* Available in PDF on Blackboard  
(9<sup>th</sup>) 9<sup>th</sup> edition page numbers  
(8<sup>th</sup>) 8<sup>th</sup> edition section numbers

### 8/30: The Role of Quantitative Methods in Public Policy

#### Required Reading

Healey, Chapter 1

\*Achen, C. H. (2002). Advice for Graduate Students taking a Graduate Course in Statistical Methods. *The Political Methodologist*, 10(2), 10-12.

\*Excerpts from *The Onion*

### 9/6: Descriptive Statistics

#### Due

Homework Assignment #1

#### Required Reading

Healey, Chapter 2, *except* 35-43 (9<sup>th</sup>)/2.5 and 2.6 (8<sup>th</sup>)

Healey, Chapter 3, *except* 73-76 (9<sup>th</sup>)/3.7 (8<sup>th</sup>)

Healey, Chapter 4, *except* 90-91 and 100-101 (9<sup>th</sup>)/4.2 and 4.7 (8<sup>th</sup>)

#### Optional Reading

\*Miller, J. E. (2004). *The Chicago Guide to Writing about Numbers*. Chicago: University of Chicago Press. Chapter 7: Creating Effective Charts.

Agresti & Finley, Chapter 3

Salkind, Chapters 2-4

### 9/13: The Normal Curve

#### Due

Homework Assignment #2

#### Required Reading

Healey, Chapter 5

#### Optional Reading

Agresti & Finley, Chapter 4

Salkind, pgs. 134-140

**9/20: Sampling**

Due

Homework Assignment #3

Required Reading

Healey, Chapter 6

Optional Reading

Agresti & Finley, Chapter 2

**9/27: Inference and Estimation**

Due

Homework Assignment #4

Required Reading

Healey, Chapter 7

Optional Reading

Agresti & Finley, Chapter 5

Salkind, pgs. 141-151

**10/4: Fundamentals of Hypothesis Testing**

Due

Homework Assignment #5

Required Reading

Healey, Chapter 8, *except* 204-208 (9<sup>th</sup>)/8.7 (8<sup>th</sup>)

Optional Reading

Agresti & Finley, Chapter 6

Salkind, Chapters 7 and 9

**10/11: Review for Midterm Exam**

Due

Homework Assignment #6

**10/18: Midterm Exam**

**10/25: Two-Sample Comparison of Means**

Due

Policy Memo Proposal

Required Reading

Healey, Chapter 9, *except* 214-217, 222-225, 228-231 (9<sup>th</sup>)/9.2, 9.4, 9.6 (8<sup>th</sup>)

Optional Reading

Agresti & Finley, Chapter 7

Salkind, Chapter 10

**11/1: Analysis of Variance**

Due

Homework Assignment #7

Required Reading

Healey, Chapter 10

Optional Reading

Agresti & Finley, Chapter 12

Salkind, Chapter 12

**11/8: Chi Square**

Due

Homework Assignment #8

Required Reading

Healey, Chapter 11

Optional Reading

Agresti & Finley, Chapter 8

Salkind, Chapter 16

**11/15: Scatterplots and Linear Regression**

Due

Homework Assignment #9

Required Reading

\*O'Sullivan, E., Rassel, G. R., & Berner, M. (2008). *Research Methods for Public Administrators* (5<sup>th</sup> Ed.). New York: Pearson-Longman. Chapter 14: Regression Analysis and Correlation (pgs. 430-438 only).

\*Studenmund, A. H. (2010). *Using Econometrics: A Practical Guide* (6<sup>th</sup> Ed.). Boston: Addison-Wesley. Chapter 1: An Overview of Regression Analysis.

Optional Reading

Agresti & Finley, Chapter 9

Salkind, Chapters 14 and 15

**11/22: Thanksgiving Break**

**11/29: Mechanics of Ordinary Least Squares Regression**

Due

Policy Memo

Required Reading

\*Studenmund, A. H. (2010). *Using Econometrics: A Practical Guide* (6<sup>th</sup> Ed.). Boston: Addison-Wesley. Chapter 2: Ordinary Least Squares (pgs. 34-51 only).

Optional Reading

Agresti & Finley, Chapter 9

Salkind, Chapters 14 and 15

**12/6: Review for Final Exam**

Due

Homework Assignment #10

**12/13: Final Exam**

## Appendix: Policy Memo Guidelines

### Pedagogical Purpose

The memo gives students an opportunity to apply course concepts to real-world policy problems. Students will learn about the usefulness (and limitations) of quantitative methods beyond the class exercises and tests. This project also gives students a chance to delve more deeply into topics of individual interest.

### Topic

You can choose any topic that one of the course data sets can be used to investigate. The only guideline is that you must address an *empirical* question that your data can adequately answer. The following are some examples of topics from previous semesters:

- Does teacher experience correspond to better student outcomes in public schools?
- Is the religious profile of a state's residents related to its laws about same sex marriage?
- Are high school students who plan to attend college less likely to binge drink?
- Are gender and race related to job satisfaction among government employees?

### Due Dates

You should submit a one-page single-spaced proposal for the memo no later than **October 25**. I encourage you to submit the proposal sooner than this. While some of the concepts you will need to know for the memo will not be covered until November, you do not need to be familiar with these to choose a topic and data set. The proposal should include a proposed paper title; a short description of the policy problem; the name of the data set and a list of the variables that you plan to use; and a list of five potential sources for the review of literature. *Any student who does not turn in a **complete** proposal will be penalized one letter grade on the memo.*

Once I approve the topic, you are free to begin working on the memo. *I approve topic changes in only exceptional circumstances, so please make sure that the topic you choose is feasible and interesting to you.* The final memo is due in class on **November 29**.

### Formatting

The memo should be typed, single-spaced, using a font that is easy to read. Borders should be approximately 1" and typeface should be no smaller than 10 pt. and no larger than 12 pt. (except for headings, which can be larger). Students are *strongly* encouraged to use headings and bullets where appropriate in order to improve the readability of their paper. **Under no circumstances can the entire length of the memo exceed 10 pages.** The 10-page limit includes all references, graphics, title pages, etc.

### Figures and Tables

Students should *label* all figures and tables with a number and a title. Figures include any charts, graphs, or other visual representations of data. Figures and tables should be numbered sequentially according to where they are referenced in the text of the memo. Numbering for figures should be independent of numbering for tables (i.e., there will be both a Figure 1 and Table 1).

Students should not cut and paste Stata figures and tables into their report unless they have "cleaned up" the variable names to be reader-friendly. We will discuss this in more detail in class, but the bottom line is that your visuals should resemble those found in professional journals and reports. A layperson should be able to understand the table without being familiar with your particular data set. Figures and tables should appear in the text at a juncture that aids the reader in understanding the concepts. For example, if you reference Table 1 on page 8, try to put Table 1 on page 8 or 9.

## References

Students should reference materials in their paper with footnotes, endnotes, or parenthetical citation. I do not require a particular style, but please be consistent in the style that you choose. I recommend the *Publication Manual of the American Psychological Association* or *The Chicago Manual of Style*.

## Organization

The memo should include the following components, labeled as individual sections:

1. Introduction to the Policy Problem (approximately ½ page)  
This section introduces the reader to your topic and motivates him or her to continuing reading your memo. Explain why your topic is important and outline how your memo is organized.
2. Existing Research (approximately 2 pages)  
This section reviews current research on your policy problem. This should expand upon your introduction by explaining to the reader what we know about the policy problem. It should also lay the foundation for the hypotheses that you test in your memo. This section should include at least *ten* credible sources (e.g., journals, books). *Under no circumstances should you ever cite Wikipedia or similar websites in an academic or professional report.*
3. Hypotheses (approximately ½ to 1 page)  
This section states the hypotheses that you will test in your report. You are required to test at least *four* research hypotheses, and they should be numbered sequentially. After each one, describe what you are testing in a sentence or two and link the hypothesis back to the relevant research and theory.
4. Data (1 paragraph)  
This section describes the data set that you use to test your hypotheses. You should include the following details, insofar as they are available/relevant:
  - a. The unit of analysis (e.g., state, country, student)
  - b. Number of observations
  - c. Year of observation
  - d. Source from which the data are drawn
5. Variables (approximately 1 page, not counting tables and figures)  
This section explains the variables in the data set that you will use to examine your policy problem. You should organize it by variable. You do not need to explain all of the variables in the data set – only those that you will use in conjunction with the hypotheses you developed above. You will have a minimum of five variables, since you are testing four hypotheses that will require at least 2 variables each (you can use a variable for more than one hypothesis). This section should include the following details:
  - a. The name of the variable and a description of how it is measured
  - b. Relevant descriptive statistics, which may include the mean, median, and/or mode; the range; a frequency distribution; or standard deviation.
  - c. *Brief* interpretation of the descriptive statistics for each variable
  - d. Appropriate and creative use of graphics to depict the variables visually

6. Analysis and Findings (approximately 2 pages, not counting tables and figures)

This section begins by describing the method that you used to test the hypotheses formulated above in Section 3. After describing the method, you will explain the results of your analysis. For each hypothesis, you will discuss both the statistical *and* substantive significance. You will be evaluated on your ability to choose the correct test for each of these. You should organize this section by hypothesis and include the following components:

  - a. Remind the reader of the wording of the hypothesis.
  - b. Explain the specific test(s) you use for statistical and substantive significance.
  - c. Explain the results of the test(s). Results should also appear in figure(s)/table(s) that appear at an appropriate juncture in the text.
  - d. Explicitly state whether you reject your null hypothesis.
  - e. Explicitly link (c) and (d) to the existing research that you discuss earlier in the memo.
  
7. Conclusions (approximately ½ page)

This section concludes your memo by tying together the above sections and making suggestions for future research. It should include the following:

  - a. *Feasible* policy implications that stem from your findings
  - b. Acknowledgement of any methodological issues that may limit the conclusions that can be drawn from it
  - c. Suggestions for future policy research on your topic