

***PUAD 601: Quantitative Methods 1  
Spring 2014***

**Course Information:**

Monday 5:30-8:00 PM (Ward 104)

Instructor: Daniel Puskin

Prerequisites: An open critical mind

**Instructor Information:**

Office Hours: Monday 8:00-8:45, Tuesday 4:30-6:15, Wednesday 4:30-6:15, and by appointment.

Office: Ward 329

Email: [puskin@american.edu](mailto:puskin@american.edu)

Phone: 202-885-6210

**Learning Objectives:**

- Change the way you think about data
- Develop tools to describe data graphically and numerically
- Develop Stata skills to delve into a dataset and analyze it
- Conduct hypothesis tests to examine relationships between variables
- Be able to communicate statistical findings to a wide range of audiences
- Appreciate limits of statistical tests and the implications for policy analysis

**Course Description and Roadmap:**

This course is about using data to answer questions impacting policy making. This is the next step in your progression to becoming great story tellers (non-fiction, fiction, and something in between). How do we take a bunch of numbers and tell a story about them?

First, you need to understand how to present data in clear and compelling ways. In order to do that, you need to have a picture of the individual variables themselves. You need to know what the “representative” observation looks like and how the variable is distributed. Descriptive statistics allow us to summarize data succinctly.

Next, are your variables of interest connected? How do they move together? Does one variable moving correspond to another moving? The next section of the course will discuss capturing the strength of a relationship between variables, For example, how do more years of education correspond with future earnings?

Next, we will examine what can be inferred from a sample about the underlying population. For example, what does a survey of teenagers tell us about the health behaviors of all teens? We will also test relationships between variables. Questions like this will be explored using a range of methods including chi-squared, ANOVA and linear

regression. The final part of the course will discuss limitations of our models to get you ready for the next stage.

Throughout the course, we will be challenging what we observe. Statistical relationships by no means imply causality, but rather document a mathematical relationship between variables. You can tell a lot of different stories with numbers. Think critically about what you see, using your institutional knowledge and analytical skills. When you have the true story, you will be equipped as policy experts to take proper action. You can challenge those with misguided or disingenuous interpretations of data.

**Blackboard:**

Please check Blackboard regularly. I will post assignments, course documents, and supplemental readings. I will also use Blackboard to send out e-mails. Please have an ability to access your AU account.

**Readings:**

Two texts are required for the course.

- Moore, David S. *The Basic Practice of Statistics*. W.H. Freeman and Company. Fifth edition, 2009 (ISBN: 9781429224260)
- Wheelan, Charles. *Naked Statistics: Stripping the Dread from the Data*. WW Norton, 2013. (ISBN 9780393071955)

Additional required readings and optional readings will be provided on Blackboard. If you would like other readings to help understand the material or to dig deeper into a subject matter, please let me know.

**Calculators and Stata:**

A basic calculator may be useful for certain exercises and exams. You may prefer a graphing calculator that allows you to see more of a trail of your calculations. We will be getting our hands dirty with data. This will involve labs and homework assignments where you will be asked to use Stata to work with data and interpret output. Stata is available in the School of Public Affairs Lab in the Ward Circle Building and the Social Science Research Lab in the Hurst Building. You may also purchase your own copy of Stata at a discounted price.

**Grades:**

*Problem Sets* (15 percent).

Most weeks will have problem sets for this course. These will be distributed a week before they are due. You may discuss assignments with classmates, but must hand in your own original assignment. Problem Sets will be due at the beginning of class or at some designated time. Late submissions will not be accepted. However, your two lowest grades

will be dropped. I accept problem sets submitted by email, so long as they are in a form that is easy to open.

Each problem set will be evaluated on a check plus (2 out of 2 points), check (1.8/2), check minus (1.6/2), minus (1/2) scale. A check plus demonstrates strong command over almost all the material. A check grade demonstrates command over some of the material, but contains conceptual errors. A check minus contains major deficiencies. A minus demonstrates inadequate effort. Show your work, write legibly (or type it out), and organize your thoughts—provide a professional work product.

*Class Participation (5 percent).* Show up and engage with the material.

*Video Presentation (5 percent).* Each student will submit a short presentation on statistics in the news. Details will be given early in the semester.

*Exams (45 percent).* The class will have three exams – a quiz (5 percent), a midterm (20 percent), and a final exam (20 percent).

*Policy Memo (30 percent).* There are three separate components of the policy memo: a proposal for the research agenda worth 5 percent of the class grade; a write up of descriptive statistics and relevant t-tests worth 10 percent of the class grade; and a final product that includes regressions and analysis worth 15 percent of the total class grade. The policy memo will ask you to pose a research question and answer it using appropriate methods. I will provide a few datasets for you to select from. More information forthcoming including details about the prizes for the best papers. A late policy memo will be reduced by 1/3 of a letter grade for each day it is late.

#### **Tutors:**

These are PhD students and are an excellent resource to help you in this class. They also have larger insights into the program and the policy world. They will be available in Ward 307 at the hours listed below.

Chris Birdsall: Mondays 2:00-7:00pm [cb0491a@student.american.edu](mailto:cb0491a@student.american.edu)

Ray Zuniga: Tuesdays 3:00-8:00pm [rz0014a@student.american.edu](mailto:rz0014a@student.american.edu)

Liz Crowe: Wednesdays 1:30-6:30pm [ec2856a@student.american.edu](mailto:ec2856a@student.american.edu)

Katie Vinopal: Thursdays: 1:00-6:00pm [ky1065a@student.american.edu](mailto:ky1065a@student.american.edu)

#### **Support Services:**

If you experience difficulty in this course for any reason, please do not hesitate to consult with me or the tutor. In addition, American offers a wide range of support services.

*Academic Support Center:* (x3360, MGC 243) offers study skills workshops, individual instruction, tutor referrals, and services for all students with learning disabilities. Writing assistance is also available.

*Counseling Center:* (x3500, MGC 214) offers counseling and consultations regarding personal concerns, self-help information, and connections to off-campus mental health resources.

*Disability Support Services:* (x3315, MGC 206) offers technical and practical support and assistance with accommodations for students with physical, medical, or psychological disabilities.

*Writing Center:* (x2991, Battelle 228) offers friendly, free, and confidential individual coaching for all types of writing.

*Campus Life:* check their website (<http://www.american.edu/life>) for a listing of information that may be helpful to you throughout the semester.

If you have a disability and might require accommodations in this course, please notify me with a letter from Disability Support Services or the Academic Support Center early in the semester so that we can make arrangements to address your needs.

**Academic Honesty:**

As the Code states, “Academic Integrity is the heart of intellectual life.” Respect it! You must adhere to the rules of the University’s Academic Integrity Code (<http://www.american.edu/academics/integrity/>). You may work on homework assignments with others, but must submit an assignment in your own words. You may not copy information from a book, article, newspaper, website, other student papers, or other sources without using quotations and citations. If you paraphrase someone else’s work, cite it. If you have any questions about the Code, please ask me. Potential violations will be treated very seriously. Again from the Code: “American University views academic integrity as integral to its mission; treating it as far more serious than a disciplinary matter.”

## Course Schedule

1/13	Week 1	Course introduction Graphically representing data Describing data with numbers	Moore: Intro, Chapter 1
1/20	MLK Day	No Class	
1/27	Week 2	More describing data with numbers Probability discussion Studying different distributions	Moore: Chapters 2 (39-53), 10 (261-273) Wheelan: Introduction, Chapter 1
2/3	Week 3	Continuous distributions	Moore: Chapters 3,10 Wheelan: Chapter 2,3
2/10	Week 4	Joint distributions Marginal and conditional probability Bayes Theorem	Moore: Chapters 6,12 Wheelan: Chapters 5, 5.5, 6
2/17	Week 5	Linear relationships between variables (correlation and brief introduction to OLS regression)	Moore: Chapters 4,5
2/24	Week 6	<b>Quiz (Material from weeks 1 – 4)</b> More on Regression	Moore: Chapter 5
3/3	Week 7	Sampling data Sample means	Moore: Chapters 8,11 Wheelan: Chapters 7,8
3/10		No Classes Spring Break	
3/17	Week 8	Confidence intervals Hypothesis testing Type 1 versus Type 2	Moore: Chapters 14,15 Wheelan: Chapter 9
3/24	Week 9	Review for Midterm	Memo Proposal Due
3/31	Week 10	<b>Midterm</b>	
4/7	Week 11	t-distribution (uncertain variance) Comparison of means	Moore: Chapters 17,18
4/14	Week 12	Proportions Chi Square	Moore: Chapters 19, 22
4/21	Week 13	Anova Two Variable Regression	Moore: Chapters 23, 24 Wheelan Chapter 11
4/28	Week 14	Two Variable Regression Discussion	
5/5	Week 15	<b>Final Exam</b>	