

Quantitative Methods I

PUBP 602-01, Fall 2005

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Course Meetings: 201 Morton Hall, TTh, 9-10:20am

Office Hours: W 3:30-4:30pm, Th 3:30-5:30pm, and by appointment

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1. Course overview

Welcome to PUBP 602. I have designed this course to serve three important purposes. First, it will help you learn techniques to enable you to become smart and savvy policy analysts. It is fair to say that quantitative evidence and analysis have come to play an increasingly important role in assessing public problems and developing potential solutions. Even if you never generate statistical analyses yourself after you leave William and Mary, in the policy contexts where you work undoubtedly you will need to be able to interpret the quantitative work of others. Second, the course lays a foundation for more advanced methods courses. Thus, some of the topics this course introduces will be fundamental for subsequent work in courses addressing multiple regression techniques and time series analysis. Third, this course will help you develop the habits of mind and practice that will make you careful practitioners of statistical computing. Computers and statistical software are powerful tools that can facilitate quantitative analysis. But there are good ways and bad ways to use these tools. At several points in the semester I will take time to teach you techniques that uphold standards that have come to be accepted by analysts and academics who take this sort of work seriously. They are techniques that I have found incredibly useful in my own work. I definitely try to practice what I preach.

I recognize that some of you may be coming to this class with little or no quantitative background. That's okay. The work will be challenging, but not impossible. I am most interested in teaching you applications and not dazzling you with fancy mathematical equations. We'll wade into the math when need be, but will put most of our emphasis on actually using and interpreting the results we generate. For those of you who have already had some exposure to statistics, I am hopeful that the course applications, in particular, will encourage you to think about quantitative analysis in ways that might not have occurred to you in your previous course work or experience.

2. Readings

These books are required for purchase and are available at the William and Mary Bookstore.

- David S. Moore and George P. McCabe. 2006. *Introduction to the Practice of Statistics*, 5th ed.
- Jane E. Miller. 2004. *The Chicago Guide to Writing about Numbers*.

As the course progresses, I will make short application readings available in class and via the course Blackboard site.

3. Assignments and grading

One of my teachers in graduate school was fond of saying that statistics is not a spectator sport. I fully agree. To that end, I have designed the course to give you much practice, both in and out of class, using the statistical techniques we will explore.

I will calculate course grades based on the following items. All items must be completed to receive credit for the course. Students not completing all items will receive a grade of Incomplete.

Percent	Item
20	Bi-weekly homework assignments (5 @ 4% each)
30	Exam 1
30	Exam 2
20	Final paper

In general, I will base grades on the following percentage scale, with partial-percents typically rounded to the nearest full percent.

A	93-100	C	73-77
A-	90-92	C-	70-72
B+	88-89	D+	68-69
B	83-87	D	63-67
B-	80-82	D-	60-62
C+	78-79	F	<60

I should note that in a graduate class such as this, any grade below a B suggests that a student may be having trouble grasping key course ideas, which are essential building blocks for future courses and the work world. We should talk if you find yourself having difficulty.

Finally, because errors sometimes creep into grade calculations--and on rare occasions assignments are misplaced after they have been handed in--please keep a copy of all work submitted for this course until final grades have been processed.

3.1 Homework assignments

These assignments will focus on real life policy questions. Because course topics are cumulative, it is absolutely crucial that you hand in these assignments on time. Grading will stress the degree to which you have made a strong effort to attempt to complete all parts of each assignment. Finally, to help us provide you with feedback and to facilitate good computing practices, we will require you to follow a set of formatting guidelines for these assignments. Work that does not follow these parameters will not be accepted.

3.2 Exams

We will have two in-class exams. Both will ask you to perform calculations and will emphasize interpretation of results. The exams will be open-book and open-note.

3.3 Final Paper

The capstone paper for the course will provide you with an opportunity to demonstrate your quantitative skills in an area that interests you. I will provide some sample data sets for you to

choose from, but you are also welcome to find and use data from another source. I will provide more details on the paper's parameters later in the semester.

4. Other important notes

4.1 Daily class operation

There are a few things that will help you get the most out of our class meetings. First, it is hugely important that you try to read the textbook before class. Even if you skim the relevant pages for 20-25 minutes it will be time well spent. That way you'll be more primed for class and be able to make better sense of the material when you go back to read it again more carefully. Especially if you are new to statistics, do not expect to make sense of the material after only one read through. Second, because we will take time in class for hands on work, it will be important for you to bring your laptop computers to class. I would not recommend taking notes on your laptop, but at times we will pause to explore a dataset in small groups and then discuss the results. Finally, please ask questions in class. I know you have heard this a thousand times, but if you have a question chances are other people do, too.

4.2 Software

I discussed this issue in an email to the class in mid-August. To reiterate, I have chosen to use the program Stata for this course. Even though it is not a course requirement, I strongly urge you to purchase a copy of the program. Consider it an investment that will pay many dividends during the two years you spend here at W&M.

Fortunately, the college has entered an agreement with Stata to offer the program at a reduced price to students. Surf here to order: <http://www.stata.com/order/schoollist.html>. From that page, I would recommend that you buy the following two items: (1) Intercooled Stata and Getting Started Manual, \$145.00--this gets you a perpetual (meaning forever), rather than a one-year license; and (2) the User's Guide, \$30.00. It would be a great idea to also buy the full set of manuals, which goes for \$165.00 (and includes the User's Guide), but I can completely understand if you don't want to shell out that kind of dough. If money is really tight, at a bare minimum I would still encourage you to buy the User's Guide and then rely on campus computing resources for the software. One word of caution: Be sure not to buy Small Stata--the program is a really stripped down version that is extremely limited in its capabilities.

4.3 Academic misconduct

I lost my innocence a year ago after catching a student cheating in one of my classes. Thus, even though I hope academic misconduct will not become an issue during the semester--and I begin with the assumption that it will not--for any questions about policies regarding cheating, plagiarism, or other types of academic dishonesty, please refer to the web site of the William and Mary Honor Council and the relevant pages about the Honor Code from the Student Handbook. If I discover a student cheating I will initiate an Honor Council proceeding and, at a bare minimum, recommend to the Council that the student receive an F for the course. I take this issue extremely seriously, and hope you do too.

4.4 What you can expect from me

So far I have said a lot about what I expect from you. A fair question, though, is: What can you expect from me? Above all, I will not ask you to do things that waste your time. My experience in the classroom has convinced me that students respond best when they are encouraged to use

their minds well. I will be working all semester to create that kind of environment and I encourage you to offer suggestions on ways to improve our class meetings and, as I mentioned earlier, to ask questions in class. Further, I will provide you with lots of honest feedback in office hours, via email exchanges, and on your written work. One of my jobs is to help you all become smart data analysts, and the feedback that Monica and I provide will be geared toward pushing you to reach your potential.

5. Schedule of topics, readings, and due dates

In addition to death and taxes, one of the only certainties of life is that a course syllabus is inevitably adjusted as a semester progresses. I will do my best to keep us on track. But don't be surprised if we have to do some shuffling along the way.

Th 8/25	Course introduction <ul style="list-style-type: none"> • Moore & McCabe, pp. xxxi-xxxiv and 4-6. • Miller, Chapters 1 and 2
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I. Data description

*Note the shift: We'll meet on 8/29 at 2:30 and skip our regularly scheduled meeting of 9/1.

*M 8/29, 2:30- 3:50pm	Statistical computing with Stata <ul style="list-style-type: none"> • Jonathan Nagler. 1995. "Coding style and good computing practices." <i>PS: Political Science and Politics</i>. 28(3): 488-492. ON BLACKBOARD. • <i>Getting Started with Stata Release 9</i>. Chapter 4. "The Stata user interface" (pp. 31-35); Chapter 14. "Using the Do-file editor" (pp. 127-136); Chapter 16. "Logs: Printing and saving output" (pp. 139-144). ON BLACKBOARD.
T 8/30	Describing distributions with numbers <ul style="list-style-type: none"> • Moore & McCabe, 1.2 (Note: "1.2" refers to Chapter 1, Section 2.)
*Th 9/1	NO CLASS -- Manna at APSA meeting.
T 9/6	Displaying distributions with graphs <ul style="list-style-type: none"> • Moore & McCabe, 1.1
Th 9/8	Density curves and normal distributions <ul style="list-style-type: none"> • Moore & McCabe, 1.3

Friday, September 9. Homework #1 due by 6pm.

- Miller, Chapters 4 and 5

T 9/13	Scatterplots and correlation <ul style="list-style-type: none"> • Moore & McCabe, 2.1 and 2.2
Th 9/15	Regression <ul style="list-style-type: none"> • Moore & McCabe, 2.3

T 9/20	Regression (cont.) <ul style="list-style-type: none"> Moore & McCabe, 2.4
Th 9/22	In-class exercise <ul style="list-style-type: none"> Miller, Chapter 5

Friday, 9/23. Homework #2 due by 6pm.

- Miller, Chapter 3, pp. 33-40

II. Probability

*Note: During this block, we will likely alter one of our class meetings to accommodate the TJPPP's Washington, DC trip.

T 9/27	Randomness and probability models <ul style="list-style-type: none"> Moore & McCabe, 4.1 and 4.2
Th 9/29	Random variables <ul style="list-style-type: none"> Moore & McCabe, 4.3
T 10/4	Means and variances of random variables <ul style="list-style-type: none"> Moore & McCabe, 4.4
Th 10/6	Probability wrap-up and in-class exercise <ul style="list-style-type: none"> Moore & McCabe, 2.1 and 2.2

Friday, 10/7. Homework #3 due by 6pm.

- Miller, Chapter 9 pp. 185-190

Tuesday, 10/11. NO CLASS. Fall break.

Thursday, 10/13. EXAM #1 IN CLASS.

III. Statistics

T 10/18	Sampling distributions <ul style="list-style-type: none"> Moore & McCabe, 5.1 and 5.2
Th 10/20	Sampling distributions (cont.)
T 10/25	Estimating with confidence <ul style="list-style-type: none"> Moore & McCabe, 6.1

Th 10/27	Estimating with confidence (cont.) / Significance tests <ul style="list-style-type: none"> • Moore & McCabe, 6.2
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Friday, 10/28. Homework #4 due by 6pm.

T 11/1	Use and abuse of significance tests <ul style="list-style-type: none"> • Moore & McCabe, 6.3
Th 11/3	Inference for means <ul style="list-style-type: none"> • Moore & McCabe, 7.1 and 7.2
T 11/8	Inference for contingency tables <ul style="list-style-type: none"> • Moore & McCabe, 9.1, 9.2, and 9.3
Th 11/10	Inference for regression <ul style="list-style-type: none"> • Moore & McCabe, 10.1

Friday, 11/11. Homework #5 due by 6pm.

- Miller, Chapter 3 pp. 40-52 and Chapter 9 pp. 190-194

T 11/15	Inference for regression (cont.) <ul style="list-style-type: none"> • Moore & McCabe, 10.2
Th 11/17	In-class exercise <ul style="list-style-type: none"> • Miller, Chapter 6

Tuesday, 11/22. EXAM #2 IN CLASS.

Thursday, 11/24. NO CLASS. Thanksgiving break.

IV. Quant II warm-up

T 11/29	Multiple regression <ul style="list-style-type: none"> • Moore & McCabe, 11.1
Th 12/1	Maximum likelihood estimation <ul style="list-style-type: none"> • J. Scott Long. 1997. <i>Regression Models for Categorical and Limited Dependent Variables</i>. pp. 25-29 (focus on the logic that Figure 2.4 suggests). "LRM" means "linear regression model." ON BLACKBOARD.

Monday, December 12. FINAL PAPER DUE BY 6PM.

- Miller, Chapters 10, 11, and Appendix A