Quantitative Methods I

Fall 2016 Course Syllabus

Department of Public Policy and Administration
Course # 56:824:702

Class meetings:	Thursday 6:00pm-8:40pm
Location:	Armitage Hall 105
Instructor:	Michael S. Hayes, PhD
Email:	michael.hayes@rutgers.edu
Office:	401 Cooper Street Room 302
Office hours:	Thursday 3:00pm-5:30pm; and by appointment.
Teaching Assistant:	Shourjya Deb
TA Email:	shourjyadb@gmail.com
Office:	321 Cooper Street (Second Floor)
TA Office Hours:	Tuesdays and Wednesdays, 3:30pm to 5:30pm

COURSE DESCRIPTION & OBJECTIVES

This course is designed to prepare students for advanced quantitative methodology courses required of doctoral students. The course begins by reviewing descriptive statistics and data presentation techniques. In preparation for the study of inferential statistics, the next section of the course covers the basic of probability. A solid grounding in probability is necessary to understand how and why statistical techniques work. Building on that foundation, the heart of the course is a rigorous introduction to statistical inference: sampling theory, confidence intervals, and hypothesis testing. The final section of the course is an introduction to regression analysis, with an emphasis on interpretation of regression results.

This course is part of a two semester sequence; the second semester is Quantitative Methods II, which is a more advanced and detailed treatment of regression analysis and related topics.

The main objective of the course is that students will develop a conceptual and practical understanding of how to learn from social science data; specifically:

- Students will learn how to calculate and interpret descriptive statistics
- Students will have a grounding in probability and understand how to work with random variables, univariate probability distributions, and correlations between variables
- Students will understand the theory behind inferential statistics that supports drawing conclusions about a population from a sample
- Students will be able to calculate confidence intervals and contact basic hypothesis tests for means, proportions, and variances
- Students will understand Type I and Type II errors and will be able to calculate the power of the test

- Students will be able to read and interpret basic Ordinary Least Squares regressions as found in many academic journal articles

REQUIRED READINGS

One required textbook*:

Moore, David S., *Basic Practice of Statistics*, 5th Edition. New York, NY: W.H. Freeman and Company. ISBN: 9781429224253.

One recommended textbook:

Cameron, A.C., Trivedi, P.K, *Microeconometrics Using Stata,* Revised Edition. College Station, TX: A Stata Press Publication. ISBN-10: 1-59718-073-4.

*The required textbook is available at the bookstore. Please also check online (e.g. Amazon) for a cheaper option.

Additional required readings will be assigned and available on Sakai.

ASSESSMENT OF PERFORMACE

Achievement of course objectives will be measured through the instructor's evaluation of problem sets, two midterms, and one final exam. I am always willing to discuss your grade on any assignments. Please do not hesitate to see me if you think that my evaluation of your work is unfair or just plain wrong. Specific requirements and evaluation procedures are detailed below:

7 Problem Sets (weighted equally, 5% each)	35%
2 Midterm Exams @ 15 percent each	30%
Final Exam	35%
Total:	**100%**

Below provides more detail on the course requirements:

Problem Sets – 35%
Students will complete seven problem sets designed to test the comprehension of material covered in class (see the schedule for the exact due dates). You may consult with your classmates (see the study group policy below). However, each student must write-up and turn-in their own work/assignment. Assignments deemed too similar to another students' will receive a score of 0. Working (struggling) on the homework is the only sure way to master the material. All homework assignments are due at the beginning of the class. I am willing to receive them via email or in person. **Late assignments will not be accepted**.

Exams – 65%
There will be two midterm tests during the semester on October 6th and November 10th. The first midterm exam covers fundamentals of data, descriptive statistics, correlation, and probability.

The second midterm exam covers sampling theory and hypothesis testing. The final exam, scheduled for December 15th, is comprehensive. All tests are *open book, open-note*. A calculator is necessary, hopefully one with which you are familiar. *Laptop computers are not permitted during the test*. Mark your calendar now because it is ***very unlikely*** that I create make-up tests or re-schedule tests for any one person.

Grade will be assigned as follows: Letter grades will determined based on the overall course average, rounded to the nearest whole number. Only certain letter grades are available for graduate course work at Rutgers-Camden. The translation of a numeric grade to a letter grade will be done as follows:

A	90-100
B+	85-89
B	80-84
C+	75-79
C	70-74
F	0-69

COURSE FORMAT & POLICIES

Each class will involve a combination of lecture, class discussion, and Stata work. At the beginning of each class, I will distribute a set of study questions that will assist you in thinking about the key takeaways from the lecture and in preparing for the exams.

Students are strongly encouraged to participate in class discussion and to ask questions. Everyone in class brings a unique perspective, and I believe that perspective is a valuable addition to the course. Please come to class prepared and ready to participate.

Technology

This is a course about concepts, not software. Nevertheless, we will use software at times to reduce computation burden. *Stata*, version 13.1, is the official software for the class, but any recent version of Stata will work nearly as well. *You do not need to buy Stata*. It is available on the Rutgers on-line system (apps.rutgers.edu) and in the Robeson Computer Lab. However, if you wish to use Stata on your own equipment, a special discounted version will be available to students through the "grad plan." You can get a six-month license for "Small Stata" (student version) for only $35. This version is limited to 1,200 observations, but it will be adequate for this course. However, if you are going on to Quantitative Methods II in the Spring and/or have an interest in doing empirical work, it would make sense to order at least Stata/IC (one year license, $98; perpetual license, $189). To order, please contact StataCorp directly: Phone 800-782-8272 (Monday through Friday 8:00 to 5:00 Central Time). Be sure to ask for the "grad plan." If ordering online, use your Rutgers email address to verify affiliation with the university.

Make-up Work & Exams

I *do not typically* allow students to make-up exams or earn a grade of incomplete. The material in this course is best learned as a single unit. Please 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 reserve the right to 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 date of the test.*

Attendance

Attendance is entirely optional. However, you are responsible for everything covered in this class whether it was covered in the readings or not. For most students, attendance is necessary condition for learning the material. The PowerPoint slides are not a substitute for attending the class, because the slides are not self-contained – they are props to give structure to my lectures and our class discussions. If you need to miss a class, be sure to get notes and a recap from a classmate.

Study Groups

You are encouraged to form and participate in a regular study group. Study groups are permitted and encouraged to work on the problem sets together. However, *each individual student would write up his or her own answer to hand in, based on his or her own understanding of the material. Do not hand in a copy of another person's problem set, even a member of your own group*. Writing up your own answer helps you to internalize the group discussions and is a crucial step in the learning process.

Communication

I use Sakai and email to communicate with you. Check your Rutgers e-mail for announcements, assignments, and solutions. It is your responsibility to check your Rutgers e-mail. I acknowledge every email that I receive. If you do not get my reply within a day, please check if you sent it to my email address (michael.hayes@rutgers.edu) and/or contact me otherwise. You can also reach me at michael.hayes012@gmail.com.

Students with Disabilities

If you have or believe you have a disability that may impede your learning, please contact the Disability Services Office. I will make every effort to accommodate you in accordance with Rutgers University's policy, procedures and College Coordinator recommendations. Additional information can be found at http://studentaffairs.camden.rutgers.edu/disability.html.

ACADEMIC HONESTY

Violations of academic integrity include cheating on tests or handing in assignments that do not reflect your own work and/or the work of a study group in which you *actively* participated. *I have a policy of zero tolerance for cheating*. Violations will be referred to the appropriate university authorities.

Principles of academic integrity require that every Rutgers University student:

- properly acknowledge and cite all use of the ideas, results, or words of others.
- properly acknowledge all contributors to a given piece of work.
- make sure that all work submitted as his or her own in a course or other academic activity is produced without the aid of unsanctioned materials or unsanctioned collaboration.
- obtain all data or results by ethical means and report them accurately without suppressing any results inconsistent with his or her interpretation or conclusions.
- treat all other students in an ethical manner, respecting their integrity and right to pursue their educational goals without interference. is requires that a student neither facilitate academic dishonesty by others nor obstruct their academic progress.
- uphold the canons of the ethical or professional code of the profession for which he or she is preparing.

Adherence to these principles is necessary in order to insure that:

- everyone is given proper credit for his or her ideas, words, results, and other scholarly accomplishments.
- all student work is fairly evaluated and no student has an inappropriate advantage over others.
- the academic and ethical development of all students is fostered.
- the reputation of the University for integrity in its teaching, research, and scholarship is maintained and enhanced.

Failure to uphold these principles of academic integrity threatens both the reputation of the University and the value of the degrees awarded to its students. Every member of the University community therefore bears a responsibility for ensuring that the highest standards of academic integrity are upheld.

More information on the Rutgers University Academic Integrity Policy can be found at http://academicintegrity.rutgers.edu/.

Course Schedule:
The course outline below is designed to guide us through the semester to meet objectives of the class.

Week	Date	Topic	Assignment/Readings
1	Sept. 8	Intro to Class, and Descriptive Statistics	Moore, Chapter 2 Moore, Chapter 1 (pp. 3-4 only) Moore, Chapter 11 (pp.291-92 only)
2	Sept. 15	Descriptive Statistics (Cont.)	Moore, Chapters 1 and 2 **Problem Set #1 Due**
3	Sept. 22	Basics of Probability	Moore, Chapters 10 and 12
4	Sept. 29	Probability Distributions	Moore, Chapters 3, 11, and 13 **Problem Set #2 Due**
5	Oct. 6	**Midterm Exam #1**	
6	Oct. 13	Sampling Theory	Moore, Chapter 11
7	Oct. 20	Confidence Intervals	Moore, Chapters 14 and 19 **Problem Set #3 Due**
8	Oct. 27	Hypothesis Testing I	Moore, Chapters 15, 17, 18, 20 **Problem Set #4 Due**
9	Nov. 3	Hypothesis Testing II	Moore, Chapters 22 **Problem Set #5 Due**
10	Nov. 10	**Midterm Exam #2**	
11	Nov. 17	Bivariate Analysis I	Moore, Chapters 22 and 4
12	Nov. 24	No Class – Thanksgiving	
13	Dec. 1	Bivariate Analysis II	Moore, Chapter 5 **Problem Set #6 Due**
14	Dec. 8	Multiple Regression	Moore, Chapter 27 **Problem Set #7 Due**
15	Dec. 15	**Final Exam**	

Please note: This schedule may be adjusted