

**BUSH 631:602/603 Quantitative Methods I**

**Fall 2012**

**M-W 9:30 – 10:50am Allen 1017**

**M-W 3:05 – 4:20pm Allen 1017**

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Allen 1063

**Required Materials:**

- Meier, Kenneth J., Jeffrey L. Brudney, and John Bohte. 2011. *Applied Statistics for Public and Nonprofit Administration*, Toronto, Ontario: Thomson Wadsworth. 8<sup>th</sup> Edition.
- Acock, Alan C. 2012. *A Gentle Introduction to STATA*. College Station, TX: Stata Press. 0-59718-009-2. 3<sup>rd</sup> Edition.
- STATA statistical software, version 12 IC (intercooled), perpetual license recommended
- Additional materials will be made available on our webct vista course page.
- Calculator (such as Texas Instruments BA II Plus Financial Calculator)

**Prerequisites:** None

**Course Description and Course Objectives:**

This is a graduate course in quantitative social science research methods. It is designed to help you: 1) develop analytical skills of scientific inquiry; 2) improve your research design abilities; 3) assess the validity of information presented to you, and 4) learn basic statistical skills. This will be a course filled with new and interesting information.

The course will cover basic rules of scientific inquiry, approaches to statistical analysis, and methods of research design. We will spend a portion of the course learning the STATA statistical software package and the avenues it opens to statistical analysis. As a public servant the skills you learn in this course will be invaluable to your career as a decision-maker, whether in the public, non-profit, or private sector.

In general, topics include: research and experimental design, measurement, sampling, survey research, descriptive statistics, probability theory, inferential statistics, hypothesis testing, difference of means, contingency tables, the chi-square test and other measures of non-parametric statistics, and the basic regression model.

I will not have time to cover all textbook materials in class, and my lectures will cover items that are not in your books. For this reason, a well-rounded approach to studying and reviewing material (readings, notes, homework assignments) is optimal.

**NEO Account:**

You must have a NEO email account in order to log on to the WebCT Vista system, and to receive class announcements and emails. You are responsible for making sure that your neo account is current and working. If you do not have one, you may obtain one at: <http://neo.tamu.edu>.

**Learning Outcomes:**

By the end of the semester, you should be able to:

- Identify different methods of research design and be able to discuss why particular methods might be appropriate.
- Discuss methods of data collection including surveys and survey question design, survey sampling options, and determining sample size,
- Complete training leading to certification to conduct Human Subjects research
- Assess the reliability and validity of various research projects, including experimental and quasi-experimental research designs.
- Generate and interpret basic descriptive statistics, and measures of central tendency and dispersion.
- Generate, interpret, and perform hypothesis tests using basic inferential statistics.
- Analyze contingency tables or similar tools illustrating that correlation is not causation.
- Understand basic linear regression.
- Determine and interpret the relationship between a dependent and independent variable using a model with control variables.
- Read and critique scholarly articles presenting statistical information.
- Understand the normal, binomial, and Poisson probability distributions and be able to determine which situations are most apt for each distribution.

**Course Components:**

- 5% Attendance and *Active* Participation
- You *must* attend class having completed all assigned readings. This is the only way you will know which questions you need to ask and where you need help in the material. I encourage you to not only complete the readings, but to work through the example problems in the text, especially if you are having difficulties understanding the material.
  - You should also review all your notes from the previous week of classes. During class, we will be able to put your work to best use by working together to iron out your challenges.
  - Occasionally, you will be asked to prepare material for discussion during class. You will also work on in-class simulations and activities using datasets, or example problems. Sometimes these activities will be due to me at the end of class or the beginning of the next class period. They will contribute to your participation grade for that week.
- 40% Homework Assignments
- You will be given a homework assignment every week. You must complete the homework assignment for a given week and turn it in on Tuesday *of the following week*, at the beginning of class. Each assignment will be made available to you no later than Friday in the week of the material covered, and will be labeled with the name of the week of class. For example, your homework assignment for Week 2 will be called "Homework, Week 2," and will be available on WebCT no later than Friday, September 9<sup>th</sup>. This homework assignment is due at the beginning of class on Tuesday morning of Week 3, September 13<sup>th</sup>.
- 55% Exams (25%, 30%)
- There will be two exams over the course of the semester. The first will be a combination of class time and take-home, and the second will be exclusively take-home.

**Grading:**

The standard Bush School scale will apply:

90%-100%	A	Extraordinary, excellent work and mastery of concept
80%-90%	B	Good work and solid command of concept
70%-80%	C	Adequate work and sufficient understanding of concept
60%-70%	D	Poor work, little understanding of concept
0%-60%	F	Lack of work, no understanding of concept

**Challenging a Grade:**

Each homework assignment will have an answer key posted on the WebCT after grading is complete, including the amount of points possible for each component of the homework. Should you have a dispute regarding the way your homework or exam is graded, *look at the answer key first*. Should you still feel your complaint is justified, you must submit a **typewritten challenge form** (there is a form on our course site, and on my website) explaining why you believe your grade should be changed, attached to the assignment in question. Absolutely no grade challenges will be entertained in person. **Please note** that your entire assignment/exam is subject to being re-graded, should you choose to challenge your grade.

**Extra Credit:**

There is no extra credit for this course.

**Late work policy:**

**Late homework assignments will not be accepted.** Early homework assignments will always be accepted. If you find yourself in a situation where you cannot make it to class and cannot give your homework to a colleague to turn in for you, you may email the homework to me or slip it under my office door, along with an explanation for why you are not in class. Otherwise, you are expected to attend class and turn it in yourself.

**As the last exam is a take-home exam, it is due at 11:00am on Wednesday, 5 December 2012.** You will need to give me an electronic copy and a hard copy. If you turn in your exam on December 5<sup>th</sup> at 11:01am or later, you will be penalized 5 percentage points. From then on, until you turn in your exam, every time the clock strikes midnight, you will be penalized 5 more percentage points.

**Honor Code:**

"An Aggie does not lie, cheat, steal, nor tolerate those who do."

A grade of zero will be given to anyone who cheats on any exam or homework assignment, or who commits plagiarism. Plagiarism is commonly defined as passing off as one's own the ideas, words, writings, music, graphs, charts, datasets, etc., that were originally created by another. In accordance with this definition, you are committing plagiarism if you copy the work of another person and turn it in as your own, even if you have the permission of the original author. Plagiarism is cheating. It is a violation of personal and academic integrity, and it will not be tolerated. If you have any doubt that you might be committing, or about to commit, an act of plagiarism, stop and consult me or another faculty member first.

It is impossible to stress how seriously I take the Honor Code. If you are found to be in violation of the honor code, you will be sent through the proper Bush School and TAMU channels, you will likely fail this course, and you may be expelled. Thoughts to keep in mind:

- Preparing for lectures with fellow students and working example problems together is permissible and encouraged.

- Homework problems should be submitted individually, even if the preparation to do those problems takes place in groups. Each assignment should be written/typed in your own words. Your grade rests entirely on your own work.
- If you choose to work on your homework in groups, it is understandable that the mathematical portions of your assignments (equations, formulae, computer code) may appear similar. When it comes to written portions of work (sentences, paragraphs, descriptions, definitions), these portions must be written in your own words. A word-by-word duplicate of another person's solution is considered cheating.
- You are encouraged to use discussion streams (on WebCT) with each other to help each other work through confusion.

For questions about Honor Council Rules and Procedures: <http://www.tamu.edu/aggiehonor>.

### **Students with Disabilities:**

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for person with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe that you have a disability requiring accommodation, please contact the Department of Student Life, Services for Students with Disabilities, in Cain Hall or at 845-1637.

### **On Graduate School**

*There is nothing quite as practical as a good theory.*  
Kurt Lewin, 20<sup>th</sup> century American social psychologist (1890 – 1947)

Much of your undergraduate education taught you to answer questions for which you were already given the answers. In graduate school you will learn how to ask questions, and to find answers to previously unanswered questions. The transition from answering questions to asking them is generally not easy.

At the Bush School the learning process is designed to prepare students to assume responsible leadership positions. While here you will learn about how to use (and not misuse) management and policy making theory and data in order to be more effective and ethical public servants. This journey begins with the core courses of Economics, Leadership, Policy Formation, and Quantitative Methods. Acquiring specific content knowledge is not the end, however; it is the foundation for graduate work.

With content knowledge as background, students develop and practice the attitude of reflection that permits comprehension to inform practical action. It is this understanding that enables the formulation of questions and ultimately your independent search for answers.

### **The role of faculty**

Bush School faculty members play a critical role in your graduate education through their support of your learning. Faculty members are responsible for developing course content including selecting readings, designing assignments, and setting standards of performance. They serve as role models and mentors for the graduate student body and continue to expand the intellectual capacity of the Bush School and Texas A&M University with their own research, committee work, and publications.

The privilege of serving on the TAMU graduate faculty is taken seriously. This is reflected in our teachers' professional and scholarly activity and service to the university, to government and nonprofit organizations, and to the broader community of learning. Each faculty member is committed both to high academic standards and to your learning.

While its members share a strong commitment to students and learning, the faculty is diverse in its composition, experience, specialties, approaches to teaching, and opinions. The richness of your intellectual growth is enhanced by the differences you will see and experience.

### **The role of the student**

Students come to the Bush School with a wide range of backgrounds and preparation. You are prepared for some tasks and not at all prepared for others. While our faculty stands ready to help you, it is you who will make decisions about how to approach the difficult task of learning to analyze, think, support your ideas, and to ask and answer questions. The responsibility for your growth and learning is yours.

Graduate school is your new job: you will likely spend 50-60 hours per week attending class, completing readings, conducting research, writing papers, preparing presentations and discussions, and working problem sets. The configuration of the work varies. Sometimes you will work alone; often you will work in teams, mirroring the experiences you will most likely have in your professional career.

As a graduate student you will gain a great deal of experience in figuring things out. For example, your teachers will not tell you what you should remember or conclude from the readings – assignments are designed to help you develop your thinking skills, not to answer particular questions posed by the professor (although s/he will surely question you). You will be given guidelines by each professor, but you will rarely be given step-by-step instructions for assignments...your learning is your responsibility and graduate school offers the opportunity for you to practice learning in a setting which is both demanding and supportive. Although the content covered in your classes is important, it is only secondary to the critical thinking skills that you gain from studying and discussing this material. These skills will help you deal with the unfamiliar after you leave the Bush School.

Resources for your success are all around you at the Bush School. Faculty members will help you, administrative staff will help you, classmates and colleagues will help you. All TAMU resources are at your fingertips: on-line research capacity, writing instruction, student services, and technical resources. Yet you must decide to take advantage of all the richness of the university community in order to improve your grasp of an applied discipline in public service.

As Kant's criteria of "systematic" understanding suggests, you are about to commence learning to look through the lens *and* to look at the lens. Welcome to graduate school!

### **Some Websites that May Help you with Fundamental Concepts:**

The ***Khan Academy*** offers tutorials and test modules on a multitude of topics. You may find help with:

**Arithmetic:** All of it

**Developmental Math 1 and 2:** All of it,  
especially, equations of lines

**Pre-algebra:** [Introduction to Logarithms](#)

**Algebra:** [Simple Equations](#) ; [Systems of equations](#)

**Algebra 1 Worked Examples:**

[Graphing a line in slope intercept form](#)

[Simplifying Expressions with Exponents](#)

[Simplifying Expressions with Exponents](#)

[2](#)

[Simplifying Expressions with Exponents](#)  
[3](#)

**Calculus** (we don't use calculus in our class, but it's a good foundation/practice for all your analytical courses):

[Calculus: Derivatives 1 \(new HD version\)](#)

[Calculus: Derivatives 2 \(new HD version\)](#)

[Calculus: Derivatives 2.5 \(new HD version\)](#)

[Partial Derivatives](#)

[Partial Derivatives 2](#)

**Probability** and **Statistics**: These two will give you the biggest head start on our actual course content, although not necessarily in the order in which we'll cover it. Practically all of the lectures under these headings are relevant, so I'm not going to list them all here. Keep in mind that you can watch the lectures now, you can watch them during the semester, and you can always return to this site during the semester if you have other issues to untangle.

Another site, **Purple Math**, offers tutorials on Algebra ranging from the Preliminary (absolute value and factoring) to the most advanced (trigonometry). During our course, we will be using a lot of basic mathematic notation that you may not have used in many years, or that you may not have ever used at all. Purple Math can help you by introducing these terms and notational concepts to you before we implement them in class. If you are familiar with them ahead of time, your class work will be much more productive.

Visit this link: <http://www.purplemath.com/modules/index.htm>. If the concepts are already familiar, you will have a great time in class! If foreign to you, please consider reviewing the following lessons before each of them comes up in class (some of you may want to go over them before the semester begins):

**Preliminary Topics:**

- Absolute Value
- Factoring Numbers
- Fractions
- Negative Numbers
- Rounding
- Set Notation

**Beginning Algebra Topics**

- Canceling Units
- Exponents
- Intercepts
- Ratio & Proportion

**Solving Word Problems**

- Translation

**Appendix**

- Factorials

**...and the beginnings of trig**

- Greek Letters & Their Names

### Course Schedule and Assignments:

Week #	Topic	Reading	Assignment	Notes
<b>Week 1</b> (8/327-8/29)	Introduction; Protection of Human Subjects, Stata and Dataset Creation	MBB Chapter 1; Acock 1; Complete IRB Training at <a href="http://researchcompliance.tamu.edu/irb/trainreq">http://researchcompliance.tamu.edu/irb/trainreq</a>	IRB Training HW, Week 1	
<b>Week 2</b> (9/3-9/5)	Research Design, Measurement, Sampling, Stata	MBB Chapters 1-3; Acock 1-3	Homework, Week 2	
<b>Week 3</b> (9/10-9/12)	Description, Dispersion, Central Tendency, Stata	MBB Chapters 4-6; Acock 4-5	Homework, Week 3	
<b>Week 4</b> (9/17-9/19)	Probability	MBB Chapter 7-8	Homework, Week 4	Tough stuff!
<b>Week 5</b> (9/24-9/26)	Probability and the Normal Distribution	MBB Chapter 7-8	Homework, Week 5	Simulation #1, Wednesday
<b>Week 6</b> (10/1-10/3)	Binomial, Poisson, and Stata	MBB Chapter 9, "The Poisson Distribution," from Chapter 10	Homework, Week 6	
<b>Week 7</b> (10/8-10/10)	<b>Exam 1 on Tuesday, 10/11</b>	Covering MBB Chapters 1-10	Homework, Week 7	In-class Stata exercise, 10/13
<b>Week 8</b> (10/15-10/17)	Inference and Hypothesis Testing	MBB Chapter 11	Homework, Week 8	Simulation #2, Wednesday
<b>Week 9</b> (10/22-10/24)	Estimation, Proportions and Sample Size	MBB Chapters 12-14; Acock 7	Homework, Week 9	
<b>Week 10</b> (10/29-10/31)	T-tests with Stata	Acock 7 (MBB Chapters 12-14)	Homework, Week 10	Simulation #3, Wednesday
<b>Week 11</b> (11/5-11/7)	Analysis of Nominal and Ordinal Data	MBB Chapter 15-17; Acock 6	Homework, Week 11	
<b>Week 12</b> (11/12-11/14)	Lines and Linear Relationships; Simple Linear Regression	MBB Chapter 18; Acock 8, 10	Homework, Week 12	
<b>Week 13</b> (11/19-11/21)	Regression Model Fit and Inference	MBB Chapter 18-19; Acock 10	Homework, Week 13	Afternoon students may come to morning section: <b>1017</b>
<b>Week 14</b> (11/26-11/28)	Model Fit and Review	Last Exam given out, due Dec 5 at 11am		