Public Policy 603
Data Analysis 1

Course Syllabus
Fall 2012

Lectures: TR 9:30 - 10:45 a.m. 112 SWKT
Labs: TR 12:00 - 1:50 p.m. 105 SWKT

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Announcements

I regularly make announcements, clarifications, further instructions, etc., in class and by email. You are responsible for all of these, even if you do not attend class. You are also responsible for keeping your email up to date at my.byu.edu. (You should let me know if your email changes during the semester.) I suggest that you exchange phone numbers and/or e-mail addresses with other students in the class.
Office Hours

I will hold office hours on Mondays and Wednesdays 3-4 p.m. I am also available at other times if you make arrangements with me. I encourage you to come by to talk about assignments in the class, suggestions for improving the class, politics and current events, the perils of student life, or for any other reason. (Suggested topics: playing the organ, practicing yoga, soccer, student evaluations, Choose to Give program, BYU tuition.)

Learning Outcomes

This course explores the fundamental concepts of research design and empirical analysis, with a heavy emphasis on econometrics.

This course is designed to help you

- Understand the concepts that form the foundation of statistics.
- Become an excellent consumer of quantitative arguments (particularly statistical arguments).
- Become a competent regression analyst, able to utilize statistical techniques and quantitative data to support your own arguments.
- Become familiar with prominent statistical packages.
- Explain quantitative and analytical results to a regular person.

We will emphasize application and interpretation over theory. Thus, in addition to the textbook, we will read articles that apply these methods to problems in public policy.

As a result of its recent accreditation experience (and increasing emphasis from the Department of Education to measure educational outcomes, e.g. NCLB), each program at BYU has developed a set of expected student learning outcomes. These will help you understand the objectives of the curriculum in the program, including this class. In the parlance of the Public Policy Program's learning outcomes, this course helps you develop the skills of:

- perform detailed statistical analysis, including multiple regression analysis, and will understand the strengths and limitations of statistical measures in conducting public policy research.
- develop a proficiency in computer software relative to conducting policy analysis, including statistical software and spreadsheets.
- write effectively for different audiences, including elected officials and other policy decision makers, policy analysts, and the public.
- achieve excellence in making oral presentations to different kinds of audiences and master presentation software.

Prerequisites

This is the first course in the statistical methods sequence in the Public Policy Masters Program. This course assumes that you have taken an introductory statistics course (such as PlSc 200, Stat 221, or Econ 378). This course also assumes a basic understanding of high school mathematics and calculus (e.g. Math 112). Students
who mastered the material in their prerequisite course will be at an advantage. This course is taught at the
graduate-level and demands not only an understanding of the material in the course prerequisites but also the
intellectual maturity and dedication required to work through the required readings and assignments at an intense
pace. This will likely be the most demanding course you have this semester.

Requirements

A Chinese proverb (supposedly) says, "I hear and I forget, I see and I remember, I do and I understand." This
philosophy drives the requirements of the class.

<table>
<thead>
<tr>
<th>Weekly Assignments</th>
<th>30%</th>
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<tbody>
<tr>
<td>Midterm Exam</td>
<td>15%</td>
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<tr>
<td>Final Exam</td>
<td>30%</td>
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<tr>
<td>Research Project</td>
<td>25%</td>
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</tbody>
</table>

All assignments are due at the beginning of class. You will most likely turn these in electronically to the TA. **I will not accept late assignments.** The primary reason for no late assignments is so that we can discuss the
assignment in class immediately after it is turned in.

**Weekly Assignments**

To understand statistics, you must *use* statistics. Each week you will be required to complete assignments that
will include a variety of activities ranging from statistical theory problems to analyzing data and interpreting
statistical results. Part of each assignment is explaining concepts and results to a lay audience. Generally, weekly
assignments will be posted on the above link after class on Thursday. (We will record scores on assignments and
exams in Gradebook.)

You may work together on these assignments (in groups of two or at most three), but you must write up your
answers separately. I give much more detailed instructions on how to report your work together in the Academic
Honesty section below. Generally, if you use other persons' work, or make changes to your own work without
inquiring or understanding what you did incorrectly, then you are trying to get a grade using someone else's
knowledge. Giving or receiving answers in this manner is not permitted in this course. If you do not learn how to
analyze or solve problems on your own, you will have difficulty on the exams and research project. Generally,
weekly assignments will be distributed and due on Thursdays.

**Exams**

There is a midterm and final exam. These are both take-home exams. They will require you to solve problems
similar to case studies in the weekly assignments. **You are not allowed to consult with anyone on these take-
home exams.** The midterm exam is taken home for a week, and is in place of the weekly assignment. (There is
no class during the midterm exam.) The final exam will cover material for the whole semester. It will be
distributed on the first day of finals, and is due at the end of finals period. Although this is different than most
exams taken during the final exam period, the dean has reviewed this plan, and states that it is within university
policy.

**Research Project**

Each student will write a paper on a policy topic of his or her choosing. The project will allow you the opportunity to apply the skills that we will develop in this class to actual data and problems. You may pursue any topic of your choice, subject to instructor approval. (Of course, one requirement is that you have the necessary data.) In your project, you will test a theory that uses a continuous dependent variable (roughly) and at least two independent variables. There will be three steps (e.g. gathering data, preliminary analysis) that will be part of weekly assignments.

I strongly recommend that you consult with me and the teaching assistant through all phases of your research. We will be able to help you select a feasible topic, find data, or comment on your statistical model.

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<thead>
<tr>
<th>Assignment</th>
<th>Date Due</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Proposal</td>
<td>September 13</td>
<td>part of Assignment 2</td>
</tr>
<tr>
<td>Data Summary</td>
<td>October 4</td>
<td>part of Assignment 5</td>
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<tr>
<td>Outline</td>
<td>October 25</td>
<td>part of Assignment 7</td>
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<tr>
<td>Paper</td>
<td>November 29</td>
<td>65%</td>
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<tr>
<td>Presentation</td>
<td>December 4 or 6</td>
<td>35%</td>
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**Proposal**

Turn in a 1-2 page, double-spaced proposal (standard font and margins) that outlines the policy question you plan to address, explains a potential causal connection linking an independent and dependent variable, offers at least 4 relevant citations, and discusses possible data sources to be used.

**Data Summary**

Turn in a one-page, double-spaced document (standard font and margins) that offers details about the data set that you have **obtained**. The summary should include summary statistics and any relevant figures that help describe the data.

**Outline**

Turn in a combination of initial results displayed in tables and figures, including model diagnostics, along with some bullet points interpreting your results.

**Paper**

The paper's technical level may be higher than the presentation's. However, you should still explain what your statistical results mean in layman's terms. You should provide an executive summary. You should also compare the cost effectiveness of any proposed policy compared to next best alternative. (For example, how do helmets compare to seat belts or speed limits?) In grading the paper, I will consider how well you have used material
from the course, how well you have used statistical analysis to test your hypotheses, if the analysis is actually correct (numerical accuracy and correct interpretation), how well you use charts and graphs, logic and organization of the paper, and the usual grammatical and spelling concerns. The papers may be picked up in the Political Science office (745 SWKT) after they are graded. The papers will be discarded at the end of the Winter 2012 semester.

As a statistical analyst, it is very important that you are aware of the limitations of your research. Under what circumstances do your results hold? Likewise, which circumstances would make them invalid? If you are unable to conduct the ideal analysis (perhaps due to resource constraints), explain what the proper approach would be. If you were able to use this superior approach, how would the results likely differ from the results you have?

Presentation

All students will present their research during the last week of class. The presentation's technical level should be geared toward a generic public servant: You should avoid tables and technical details, and you will have to explain what your statistical results mean. There will be a strict time limit, and you should be prepared to answer questions from the class and instructor. Further suggestions on presentations generally can be found here.

How to Succeed in this Course

The course is graded on a modified curve, using statistical principles that will be explained in more detail in the course. The basic idea is that I will look for natural breaks between students and assign grades accordingly. Thus, I do not assign a set number or percentage of As, Bs, and Cs.

I will award the higher of two grades:

1. your overall point total
2. your point total using only the final exam and research project

To use #2, you must complete the weekly assignments (Assignment 0 does not count) and the midterm exam. (Turning in a sheet of paper with your name on it is not completing the assignment. Completing an assignment means working on each part of the assignment.) This allows students who take longer to get the material to still do well in the class. However, if you do not work on the weekly assignments, you will not do well on the final exam or research project.

"The expectation for undergraduate courses is three hours of work per week per credit hour for the average student who is appropriately prepared; much more time may be required to achieve excellence" (cite).

"Graduate study is more rigorous than undergraduate study" (cite).

Putting these statements together, the university expects an average graduate student to work more than 9 hours a week in a 3 credit-hour course to achieve excellence. The work load in this course is heavy but manageable.

Students who have succeeded in this course have the following characteristics. They
• Read the material before coming to class.
• Come to class with questions.
• Study in groups to make sure they understand the material.
• Spread work on the weekly assignments across the week.
• Work early and often on their research projects.
• Seek feedback from others.

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**Lectures and Labs**

The course will be run primarily as a lecture. We will also have in-class learning exercises. In addition, I actively encourage questions and comments germane to our discussion. I urge--indeed, I expect--you to take advantage of the chance to talk with the Teaching Assistant and me during office hours.

On Tuesdays and Thursdays at noon, there will be a computer lab in 105 SWKT led by the Teaching Assistant. In the labs you will learn how to do basic and advanced statistics in Stata. The Stock and Watson website has a helpful tutorial here as well: [Stock and Watson Stata tutorial](http://www.stata.com/help/). You will also learn how to do statistics in a couple of other programs to increase flexibility and marketability for future work opportunities. Each week, the lab will cover the commands necessary to do the weekly assignments. The labs will also go over previous weekly assignments and sample exam problems.

During the second week of class, the [FHSS Research Support Center](http://www.fhss.byu.edu/) will hold Stata workshops. Attending one of the workshops will give you a good base to begin your work with Stata this semester. The times and locations are:

- Monday, September 3, 4-5 p.m. in 102 SWKT
- Tuesday, September 4, 1-2 p.m. in 102 SWKT
- Wednesday, September 5, 10-11 a.m. in 102 SWKT
- Thursday, September 6, 7-8 p.m. in 102 SWKT

(Each workshop is identical.) The Research Support Center is another resource available throughout the semester for any questions relating to Stata or statistical analysis or research.

You may find it useful to purchase your own copy of Stata. If you do not purchase your own copy, you need to plan ahead to use the computers in SWKT. Since some data sets we use have more than 1000 observations, you will need to purchase Stata/IC or Stata/SE.

Please arrive in the Computer Lab before class starts to sign in and have everything ready to go when class starts.

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**Academic Honesty and Plagiarism**

From the Academic Honesty section of the BYU Honor Code: "The first injunction of the BYU Honor Code is the call to `be honest.' Students come to the university not only to improve their minds, gain knowledge, and develop skills that will assist them in their life's work, but also to build character. `President David O. McKay taught that character is the highest aim of education' (The Aims of a BYU Education, p. 6). It is the purpose of
the BYU Academic Honesty Policy to assist in fulfilling that aim."

"BYU students should seek to be totally honest in their dealings with others. They should complete their own work and be evaluated based upon that work. They should avoid academic dishonesty and misconduct in all its forms, including but not limited to plagiarism, fabrication or falsification, cheating, and other academic misconduct" (cite). Read the full version here.

A colleague (Mitch Sanders, former professor at Notre Dame) has already explicated these issues specifically for political science. Please read here.

In this class, you need to acknowledge the contributions of others toward your assignments. I have taken the following guidelines from MIT's Unified Engineering class. I have changed and added various words where appropriate:

"The fundamental principle of academic integrity is that you must fairly represent the source of the intellectual content of the work you submit for credit. In the context of [PPol 603], this means that if you consult other sources (such as fellow students, TA's, faculty, literature) in the process of completing homework [(or Stata codes)], you must acknowledge the sources in any way that reflects true ownership of the ideas and methods you used."

"Doing homework helps to engage with the concepts and material taught in class on a deeper level. To enhance the learning process we strongly suggest that you first try to solve the problems by yourself and then discuss challenges in groups or in office hours if necessary. Discussion among students and in office hours to digest the material and the homework problems or to prepare for [exams] is considered useful in the educational process. COLLABORATION ON HOMEWORK IS ALLOWED UNLESS OTHERWISE DIRECTED AS LONG AS ALL REFERENCES (BOTH LITERATURE AND PEOPLE) USED ARE NAMED CLEARLY AT THE END OF THE ASSIGNMENT. Word-by-word copies of someone else's solution or parts of a solution handed in for credit will be considered cheating unless there is a reference to the source for any part of the work which was copied verbatim. FAILURE TO CITE OTHER STUDENT'S CONTRIBUTION TO YOUR HOMEWORK SOLUTION WILL BE CONSIDERED CHEATING."

"Study Group Guidelines"

"Study groups are considered an educationally beneficial activity. However, at the end of each problem on which you collaborated with other students you must cite the students and the interaction. The purpose of this is to acknowledge their contribution to your work. Some examples follow:

1. You discuss concepts, approaches and methods that could be applied to a homework problem before either of you start your written solution. This process is encouraged. You are not required to make a written acknowledgment of this type of interaction.
2. After working on a problem independently, you compare answers with another student, which confirms your solution. You must acknowledge that the other student's solution was used to check your own. No credit will be lost due to this comparison if the acknowledgment is made.
3. After working on a problem independently, you compare answers with another student, which alerts you to an error in your own work. You must state at the end of the problem that you corrected your error on the basis of checking answers with the other student. No credit will be lost due to this comparison if the
acknowledgment is made, and no direct copying of the correct solution is involved.

4. You and another student work through a problem together, exchanging ideas as the solution progresses. Each of you must state at the end of the problem that you worked jointly. No credit will be lost due to this cooperation if the acknowledgment is made. [You must still write up your solutions individually, not jointly.]

5. You copy all or part of a solution from a reference such as a textbook. You must cite the reference. Partial credit will be given, since there is some educational value in reading and understanding the solution. However, this practice is strongly discouraged, and should be used only when you are unable to solve the problem without assistance.

6. You copy verbatim all or part of a solution from another student. This process is not considered academically dishonest if the acknowledgement is made. However, you will receive no credit for verbatim copying from another student as you have not made any intellectual contribution to the work you are both submitting for credit.

7. VERBATIM COPYING OF ANY MATERIAL WHICH YOU SUBMIT FOR CREDIT WITHOUT REFERENCE TO THE SOURCE IS CONSIDERED TO BE ACADEMICALLY DISHONEST.

Unfortunately, some students still profess ignorance of or attempt to find loopholes in the previous guidelines. As a result of sad experience, I repeat the following guidelines and add clarifications:

- You may work together on the weekly assignments (in groups of two or at most three), but you must write up your answers separately. Starting with a group document and then giving copies of that document to members of the group is not writing up answers separately, even if individuals make various changes to the original document. You must start with separate, individual answers. If you find yourself emailing or copying files having to do with weekly assignments, you are almost certainly violating this policy. If a group is working on a single computer to conduct analyses, which are then recorded and shared, then the group is almost certainly violating this policy. If you work together on one computer, then you need to wait until you have separate computers to write up your answers. The first time I see group work turned in as individual work (even with "worked with" citations), I will take the number of points earned and divide it by the number of people in the group. The next time, the penalty will be -100% (note: not 0, but -100%).
- There are no "student solutions manuals" for Stock and Watson, 3rd ed. There is a student solutions manual for Stock and Watson, 1st ed., labeled "Solutions for Selected Exercises." It is of limited usefulness, as the problems and chapters have changed in the current edition. (It has answers to some, not all, problems in the 1st ed.) If you can track down a copy, you may use it (assuming there is anything useful), provided you follow the citation guidelines discussed above (for which you only get partial credit). As with most textbooks, there is an "instructor solutions manual." (It has answers to all problems.) You may not use this. It is only possible to get a copy of this through illicit means (e.g. sending money by PayPal to something equivalent to an essay mill, downloading from some BitTorrent site, etc.). If you have a copy of this, you are in violation of the Honor Code, and I will refer you to the Honor Code Office.
- A good shorthand for violating the Honor Code is knowing something is wrong and doing it anyway. Anytime I find a student attempting to deceive me in any way, I will refer that student to the Honor Code Office.
- If you have any questions about these guidelines, please ask me. Do not attempt to exploit loopholes.

Discrimination
Title IX of the Education Amendments of 1972 prohibits sex discrimination against any participant in an educational program or activity that receives federal funds. The act is intended to eliminate sex discrimination in education. Title IX covers discrimination in programs, admissions, activities, and student to student sexual harassment. BYU’s policy against sexual harassment extends not only to employees of the university but to students as well. If you encounter unlawful sexual harassment or gender based discrimination, please talk to your professor; contact the Equal Employment Office at 422-5895 or 367-5689 (24 hours); or contact the Honor Code Office at 422-2847.

Brigham Young University is committed to providing a working and learning atmosphere which reasonably accommodates qualified persons with disabilities. If you have any disability which may impair your ability to complete this course successfully, please contact the University Accessibility Center (2170 WSC, 422-2767). Reasonable academic accommodations are reviewed for all students who have qualified documented disabilities. Services are coordinated with the student and instructor by the SSD office. If you need assistance or if you feel you have been unlawfully discriminated against on the basis of disability, you may seek resolution through established grievance policy and procedures. You should contact the Equal Employment Office at 422-5895, D-282 ASB.

Readings

All readings should be read before class for full understanding of the subject material.

The required text for the course is:


We use this book because it is the least technical textbook that covers the material of the class. We will also use the book in Public Policy 604. The 3rd edition has some improvements over the 2nd edition, and rearranges some of the material. You could probably get away with using a 2nd edition if you did not mind consulting a classmate’s textbook when necessary. Do not use the 1st edition. The book has a web site where you can download data sets and replication files here: [Stock and Watson Student Resources](http://www.stata.com/support/textbooks/stataƏ).  

There is one optional textbooks:


In 603 (and 604), we use the statistical program Stata extensively. The Baum book covers a lot of the same material as Stock and Watson, though it has less detail and explanation. However, it integrates the material on regression with how to run any particular model in Stata. The TA lab sessions will also explain how to implement different models in Stata, but if you want an independent source of information on how to use Stata in context of 603, this is an excellent book.

There may be other articles/chapters we will read that are available through links below:

- [Agresti and Finlay, sections 2.1-2.3](http://www.stat.ubc.ca/~socsci/agsfinl21-23.htm).
- Agresti and Finlay, sections 3.1-3.4.
- Agresti and Finlay, sections 4.1-4.6.

Other information:
- Professional Memos

## Schedule (subject to change)

We will cover about a chapter a week.

Note: SW = Stock and Watson; AF = Agresti and Finlay

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<thead>
<tr>
<th>Date</th>
<th>Topic</th>
<th>Readings</th>
<th>Assignments</th>
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</thead>
<tbody>
<tr>
<td>August 28</td>
<td>Introduction</td>
<td>SW:1; AF:2.1-2.3</td>
<td></td>
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<tr>
<td>30</td>
<td>Probability</td>
<td>SW:2.1-2.3, AF:3.1-3.4</td>
<td>Assignment 0 Due</td>
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<td>September 4</td>
<td>Sampling Distribution</td>
<td>SW:2.4-2.6</td>
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<td>6</td>
<td>Sampling Distribution</td>
<td>AF:4.1-4.6</td>
<td>Assignment 1 Due</td>
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<tr>
<td>11</td>
<td>Statistics</td>
<td>SW:3</td>
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<tr>
<td>13</td>
<td>Experiments</td>
<td>SW:13.1-13.2</td>
<td>Assignment 2 Due Project Proposal</td>
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<td>18</td>
<td>Simple Regression</td>
<td>SW:4.1-4.2</td>
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<td>SW:4.3-4.6</td>
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<td>SW:5.1-5.3</td>
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<td>27</td>
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<td>SW:5.4-5.7</td>
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<td>October 2</td>
<td>Multiple Regression</td>
<td>SW:6.1-6.3</td>
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<td>Multiple Regression</td>
<td>SW:6.4-6.8</td>
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<td>Multiple Regression</td>
<td>SW:7</td>
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<td>11</td>
<td>More Experiments</td>
<td>13.1-13.3</td>
<td>Assignment 6 Due Project Data Summary</td>
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<td>16</td>
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<td>18</td>
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<td>SW:8.1-8.2</td>
<td>Midterm Due</td>
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<td>23</td>
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<td>25</td>
<td>Interactions</td>
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<td>Assignment 7 Project Outline</td>
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<td>November 1</td>
<td>Validity</td>
<td>SW:9</td>
<td>Assignment 8 Due</td>
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<td>6</td>
<td>Panel Data</td>
<td>SW:10.1-10.4</td>
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### Declaration

I often use video clips from popular culture (television programs, movies) to illustrate and emphasize the readings.

### References

I consulted numerous syllabi in designing this course. Particularly helpful were syllabi by Mike Findley, Jeremy Pope, Michael Bailey, Adam Glynn, Simon Jackman, John Jackson, Andrew Martin, and James Stock.

Jay Goodliffe's [home page](http://goodliffe.byu.edu/603/syllabus.htm)