

**CRP 5450: Inferential Statistics for Planning and Public Policy  
Spring 2015**

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**My Office Hours:** Mondays 12:30-2:00 and Fridays 10:30-12:00 and by appointment.

Teaching Assistants: Kushan Dave (kbd47) and Mauricio Sarrias (ms2822) will be the Teaching Assistants for this course. They will be available for office hours each week in our computer classroom. Their office hours serve as informal labs to review both the software and the statistical methods. Their office hours will be posted on blackboard very soon.

**Course Description:** This course is an introduction to the inferential statistical methods and econometric/regression analysis tools needed to understand empirical public policy and planning research and to do basic applied policy analysis. The statistical concepts are illustrated using data and examples primarily from the fields of public policy and planning. In this course, you will learn to apply tools of quantitative data analysis to study empirical evidence regarding real world events.

The study of economics, planning and other social sciences is carried out through both theoretical and empirical inquiry. Theory typically refers to the study of models of the real world that are governed by assumptions that simplify them. These models outline what we expect to happen in the real world based on certain assumptions. Empirical social science attempts to verify those theoretical relationships by analyzing data on these events and relationships using mathematical and statistical techniques. In other words, the empirics are used to test the validity of theoretical models. Inferential statistics and econometrics are comprised of the tools and techniques used to carry out this empirical analysis.

By the end of this course, you should be able to pose an empirically testable research question, conduct your own basic empirical research on this question, and you should be able to read and comprehend some of the empirical literature in field related journals such as the *Journal of Public Policy Analysis and Management*, *Journal of Planning Education and Research*, *Cityscape* and others.

CRP 5450 will emphasize hands-on experience with Excel and STATA and key data sources that will likely be useful in your professional work.

**Learning Objectives:**

This course will provide an opportunity for you to produce original empirical **research** and develop skills in **written and graphical communication**. The main purpose of this course is to help you develop substantial competency in inferential statistics which is a key **quantitative method** used in professional planning and policy practice.

In addition, conducting high quality empirical research requires an appreciation of **professional ethics** and depending on your choice of project for this course, you will have an opportunity to use empirical methods to examine key policy and planning concerns such as **growth and development, social justice and sustainability and environmental issues**.

**Comparable courses:** Students who have taken another introduction to statistics or econometrics course such as ILRST 5100, 5110, 6100, BTRY 6010, 6020, ECON 3120, 3125 or 3140, PAM 3100 or AEM 4110 should not take this course.

**Prerequisites:** There are no prerequisites for this course. While no prior knowledge of statistics is needed, this course will cover significantly more material than a traditional introductory statistics course. For this reason, some discussions might seem brief especially for students with no prior statistics background. Students should utilize office hours for support and, please, speak up in class if you have questions.

**Attendance:** Perfect attendance is required in this course. If you absolutely must miss class, please let me know.

**Textbook(s):** CRP 5450 is essentially a combination of two courses—basic statistics and econometrics. Consequently, I have been unable to find a single, affordable textbook that perfectly meets this course’s needs. Instead, I will rely on two excellent textbooks. Both of them are available for purchase in the bookstore and can be bought new or used on Amazon or other websites. Earlier editions of the books are fine. **Students are expected to make heavy use of the textbooks and to come to class having already read the relevant material in the texts.** Thus, I strongly encourage students to buy the textbooks especially the Studenmund text that we will be using the second half of the semester. There will be a few copies of each book available on reserve in the Fine Arts Library.

The first half of the semester we will primarily use:

De Veaux, R.D., P.F. Velleman and D.E. Bock (2014), *Intro Stats*, Pearson-Addison Wesley, 2<sup>nd</sup>, 3<sup>rd</sup> or 4<sup>th</sup> edition is fine.

The second half of the semester we will primarily use:

Studenmund, A.H. (2006/2011) *Using Econometrics: A Practical Guide*, Pearson-Addison Wesley, 4<sup>th</sup>, 5<sup>th</sup> or 6<sup>th</sup> edition is fine.

Additional readings will be posted on the course blackboard site as needed. In particular, examples of interesting and relevant empirical papers on a range of policy topics will be posted.

**Optional readings:**

There is a lot of recent public interest in the role that statistics and data analysis can play in public policy and planning. Several good popular books have been written which you might enjoy and will most likely enhance your learning. Here are a few:

1. Ayers, Ian (2008), *Super Crunchers: Why Thinking by the Numbers is the New Way to be Smart*.

2. Kahneman, Daniel (2011), *Thinking, Fast and Slow*.
3. Silver, Nate (2012), *The Signal and the Noise: Why so many Predictions Fail*.
4. Wheelan, Charles (2013), *Naked Statistics: Stripping the Dread from the Data*.

A more advanced (but highly recommended) book is

5. Angrist, Joshua and Jorn-Steffen Pischke (2015), *Mastering 'Metrics*.

**Software and Software manuals:** We will be using both STATA and Excel this semester. The software is provided on the classroom computers and on the computers in Mann Library. You can also purchase a reduced price license for STATA from the Cornell CIT website but that is not necessary. In addition, you can request free access from your home computer to the Ciser Computing System that has Stata and Excel software by applying here: [http://ciser.cornell.edu/athena\\_newacct.shtml](http://ciser.cornell.edu/athena_newacct.shtml)

Two STATA manuals will also be available on reserve in the Fine Arts Library:

Baum, Christopher (2006) *An Introduction to Modern Econometrics Using STATA*, STATA Press.

Acock, Alan, (2012) *A Gentle Introduction to STATA*, STATA Press.

#### **Other Resources on Campus:**

1. Cornell Statistical Consulting Unit (CSCU) [www.cscu.cornell.edu](http://www.cscu.cornell.edu)  
CSCU offers daily office hours with staff statisticians to answer statistical questions pertaining to research projects. In addition, CSCU runs workshops on topics that are just beyond the scope of this course and would be a logical next step if you are interested in continuing to develop your empirical skills. For example, they typically have workshops on topics such as factor analysis and on dummy dependent variables with more than two categories. See the website for more information about office hours times and workshop schedules.
2. Cornell Institute for Social and Economic Research (CISER) [www.ciser.cornell.edu](http://www.ciser.cornell.edu)  
CISER runs workshops to introduce students and faculty to various software packages such as SPSS, SAS and STATA. Occasionally they also run workshops on how to use important social and economic data sets such as the census, American Community Survey, BLS data and many more. See the website for more information about their workshops.

#### **Academic Integrity**

Each student in this course is expected to abide by the Cornell University Code of Academic Integrity. Any work submitted by a student in this course for academic credit will be the student's own work, except for group work clearly labeled as such on the course assignments. In this course, only problem sets can be submitted as group work, but even in this case, every student is expected to have answered each question. A failure to do so is considered a violation of academic integrity.

It has come to my attention that some websites post old versions of faculty problem sets—including some of mine. Posting of these materials is a violation of my copyright.

Moreover, I consider student use of my materials on these websites to be a violation of academic integrity.

Cornell has signed a license with Turnitin, plagiarism detection software. Students agree that by taking this course their paper may be subject to submission for textual similarity review to Turnitin.com for the detection of plagiarism.

### **Accommodations for students with disabilities**

In compliance with the Cornell University policy and equal access laws, I am available to discuss appropriate academic accommodations that may be required for students with disabilities. Requests for academic accommodations are to be made during the first three weeks of the semester, except for unusual circumstances, so arrangements can be made.

### **Course Requirements and Evaluation:**

Problem Sets – 50%

Problem sets will be assigned roughly every other week. There will be between 5 and 7 problem sets this semester. You are permitted to work in study groups on the problem sets, and you will always have at least 1 week to complete the assignment.

Empirical Project/Paper – 50%

The distribution of the empirical project grade is as follows:

1. Outline of project idea with likely data sources and an **annotated** bibliography due March 24- 5%
2. First sections of project with your completed literature review, data set and descriptive statistics due April 23 – 5%
3. Final project due no later than 4:30 Friday May 15 - 40%

Guidelines for the various stages of the project will be posted on blackboard and discussed in class. The empirical project/paper is an individual assignment. Each student will produce their own empirical project.

In addition to the posted guidelines Chapter 11 in the Studenmund textbook is a helpful guide to conducting and writing an empirical paper.

It is ideal if students can link their course projects to their thesis, professional report or career interests.

### **Course Schedule:**

January 22: Introduction to Data and Statistics

De Veaux et. al. (3<sup>rd</sup> edition), Chapters 1 and 2

De Veaux et. al. (4<sup>rd</sup> edition), Chapter 1

January 27—February 3: Descriptive Statistics including Correlation

De Veaux et. al. (3<sup>rd</sup> edition) Chapters 3-7

De Veaux et. al. (4<sup>rd</sup> edition), Chapters 2-6

February 5-12: Probability Theory and Probability Distributions

De Veaux et. al. (3<sup>rd</sup> edition) Chapters 14-17

De Veaux et. al. (4<sup>rd</sup> edition) Chapters 12-14

February 19-March 5: Statistical Inference

De Veaux et. al. (3<sup>rd</sup> edition) Chapters 18, 23, 19, 20, 21, 24 (ch. 22 optional)

De Veaux et. al. (4<sup>rd</sup> edition) Chapters 15-20

March 10-12: More on Correlation and an introduction to Linear Regression

Studenmund, A. H., Chapter 1

March 17-26: Multiple Regression, the Assumptions of the Classical Linear Regression Model and Inference in Regression Analysis.

Studenmund, A. H., Chapters 2-5

April 7-16: Model Specification Issues- Choosing appropriate independent variables and functional forms, using dummy independent variables and addressing multicollinearity

Studenmund, A.H., Chapters 6 - 8

April 21-28: An overview of practical strategies to deal with violations of the Classical Assumptions: Autocorrelation, Heteroscedasticity and Simultaneity.

Studenmund, A.H., Chapters 9, 10, 12 and 14.

April 30: Dummy dependent variable models—logit models

Studenmund, A. H., Chapter 13

May 5: Wrap-up and volunteer student presentations of interesting findings from their projects.