

Course Syllabus
USP 654 Data Analysis II
Fall 2011

Instructor

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Lab Instructor/Teaching Assistant

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Course Meeting Times & Location

Lecture: Wed, 4:00-6:30 pm, 270 Urban Center. Lab: Wed, 6:40-7:30, Neuberger Hall 450.

Required Text

Cohen, J., Cohen, P., West, S.G., & Aiken, L.S. (2003). *Applied multiple regression/correlation analysis in the behavioral sciences (Third Edition)*. Mahwah, NJ: Erlbaum. ISBN: 0-8058-2223-2.

Other optional texts that might be helpful:

Green, S.B., & Salkind, N.J. (2010), *Using SPSS for the Windows and Macintosh: Analyzing and Understanding Data* (Sixth Edition). Upper Saddle River, NJ: Prentice Hall. ISBN: 0136005969

Kahane, L.H. (2007). *Regression basics (2nd Edition)*. Thousand Oaks: Sage. ISBN: 1-41295126-7.

Lewis-Beck, M.S. (1980). *Applied Regression: An Introduction (Quantitative Applications in the Social Sciences)*. Newbury Park: Sage. 0-80391494-6

Pedhazur, E.J. (1997). *Multiple regression in behavioral research (3rd Edition)*. Fort Worth, TX: Harcourt Brace.

Overview

This course is designed to give students the necessary skills to analyze research projects. Together with the first course (offered in Spring), this course will be a thorough and reasonably comprehensive introduction to understanding, critically evaluating, and conducting analyses for most studies in social science-related disciplines. Because of the complexity of hand calculations with regression, there will be fewer hand computations and more reading, computer application, and interpretation this quarter.

Prerequisites

This course assumes that you have taken the previous course USP 634 Data Analysis or an equivalent course approved by the instructor and prior SPSS experience.

Grades

Your course grade will be based on three homework assignments and two exams. Homework assignments are worth 1/2 of your course grade and exams are worth 1/2 of your course grade. **Exams** will include short answer (paragraph length), multiple choice, and computations or printout interpretation. **Homework assignments** will include SPSS computer assignments, result summaries and interpretation, reading an example journal article, and some hand calculation problems. Late assignments are not accepted. If there are serious health problems or family issues, however, please contact me.

SPSS

Many of the assignments for this course will use a statistical software package called SPSS (Statistical Package for the Social Sciences). No manual or book on SPSS is required. If you would like an additional reference, there are several useful guides to using SPSS that are good. I have some preference for the book by S.B. Green and N.J. Salkind (2010), *Using SPSS for the Windows and Macintosh: Analyzing and Understanding Data* (Sixth Edition). Upper Saddle River, NJ: Prentice Hall. ISBN: 0136005969. You may be able to acquire one of the last couple of editions for less money and they will work just fine. Either Kihong or I can provide additional assistance. **Don't be afraid to ask.**

Calculator

Everyone should have a calculator to use for the course. Nothing fancy is needed, but a calculator with a log and exponential function (exp) will be needed during the logistic regression section.

Course Schedule & Readings

Important dates:

Wednesday, 10/19 - HW 1 Due
Wednesday, 11/2 - Midterm Exam
Wednesday, 11/9 - HW 2 Due
Wednesday, 11/30 - HW 3 Due
Wednesday 12/7, 3:30-5:20 PM - Final Exam

Week of	General Topic	Reading	Optional Sections/Pages*
10/5	Correlation & Simple Regression	<ul style="list-style-type: none"> Chapter 1. Introduction Chapter 2 Bivariate Correlation and Regression Chapter 4 Data visualization, exploration, and assumptions, sections 4.1-4.2 only 	1.3.1-1.3.2, 1.3.4-1.3.5, 1.7-1.8 pp. 44-47, p. 49, 2.9 none
10/12	Multiple regression I: Partial relationships	<ul style="list-style-type: none"> Darlington, Chapter 1 Basic concepts (Statistical Control), pp. 1-6 Chapter 3 Multiple Regression/Correlation With Two or More Independent Variables [optional reading] Pedhazur, Appendix A: Matrix Algebra: An Introduction [optional reading] Pedhazur, Chapter 6: General Method of Matrix Regression Analysis: Matrix Operations 	none 3.3.3, 3.5.4-3.5.6, 3.6.4, 3.7.3, 3.8.3-3.8.4 all pages all pages
10/19	Multiple regression II: Dummy coding & ANCOVA	<ul style="list-style-type: none"> Chapter 8 Categorical or Nominal Independent Variables Tabachnick & Fidell, Chapter 8 Analysis of Covariance (pp.321-375) 	p. 310, 314-315, 8.2.6, 8.3-8.4, 8.5.1-8.5.5, 8.6, 8.7.4 pp. 330-334, 352-256.
10/26	Multiple regression III: assumptions, multicollinearity, diagnostics	Chapter 4 Data Visualization, Exploration, and Assumption Checking: Diagnosing and Solving Regression Problems I, sections 4.3-4.6 only Chapter 10 Outliers and Multicollinearity: Diagnosing and Solving Regression Problems II	none none
11/2	Multiple regression IV Interactions & curvilinear effects	Chapter 6 Quantitative Scales, Curvilinear Relationships, and Transformations Chapter 7 Interactions Among Continuous Variables <ul style="list-style-type: none"> [optional reading] Newsom, Prigerson, Schulz, & Reynolds (2003). Investigating Moderator Hypotheses in Aging Research: Statistical, Methodological, and Conceptual Difficulties with Comparing Separate Regressions, <i>International Journal of Aging and Human Development</i>, 57, 119-150. [optional reading] Chapter 9 Interactions with Categorical Variables 	6.2.6-6.2.8, 6.3, 6.4.9-6.4.12 7.8-7.10 all pages all pages
11/9	Multiple regression V: Correlation, causation, & mediation	<ul style="list-style-type: none"> Chapter 12 Multiple Regression/Correlation and Causal Models, sections 12.1-12.2 only Frazier, P. A., Tix, A. P. & Barron, K. E. (2004). <i>Testing moderator and mediator effects in counseling psychology research. Journal of Counseling Psychology</i>, 51, 115-134. [optional reading] MacKinnon, D. P., Fairchild, A. J., & Fritz, M. S. (2007). Mediation analysis. <i>Annual Review of Psychology</i>, 58, 593-614. 	none none all pages
11/16	Chi-square & logistic	<ul style="list-style-type: none"> Delucchi (1993) On the use and misuse of chi-square, pp. 295-319 Chapter 13 Alternative Regression Models: Logistic, Poisson Regression, and the Generalized Linear Model, sections 13.1-13.2.16 only 	none
11/23	Logistic & multiple logistic	<ul style="list-style-type: none"> Chapter 13 Alternative Regression Models: Logistic, Poisson Regression, and the Generalized Linear Model, sections 13.2.17-13.2.19 only 	none
11/30	Multiple logistic	<ul style="list-style-type: none"> Chapter 13 Alternative Regression Models: Logistic, Poisson Regression, and the Generalized Linear Model, sections 13.3-13.6 only Coxe, S., West, S.G., & Aiken, L.S. (2009). The Analysis of Count Data: A Gentle Introduction to Poisson Regression and Its Alternatives. <i>Journal of Personality Assessment</i>, 91, 121-136. 	none none

* Please note that all boxed material in the Cohen et al. text is optional.

Supplemental Reading Sources (available online for download at the class website):

Pedhazur, E.J. (1997). *Multiple regression in behavioral research* (3rd Edition). Fort Worth, TX: Harcourt Brace.
 Darlington, R.B. (1990). *Regression and linear models*. New York: McGraw-Hill.
 Tabachnick, B.G., & Fidell, L.S. (1996). *Using multivariate statistics* (third edition). New York: HarperCollins.

Disabilities

If you have a disability and are in need of academic accommodations, please notify me immediately to arrange needed supports.

My Teaching Philosophy

In general, I work very hard at teaching, and so I expect students to work very hard at learning. I have a heavy emphasis on concepts, especially when it comes to statistics. To me, the concepts and theoretical constructs in statistics are fundamental to understanding and using statistics well. They are also the part I love most about it (ok, maybe "love" is too strong). Despite my bias toward conceptual aspects of statistics, I also believe that the practical applications are extremely important. Don't worry about ever having to memorize formulas, you can always look those up in a book if you need to. What I'd like you to avoid is a recipe approach where you follow steps to get a result without understanding what you are doing. If you follow a menu-driven recipe for getting through a regression analysis, without understanding why you are conducting the test, how to interpret it when it's completed, and when to use it, I've failed miserably in my job.

Statistics Is a Weird Subject: How to Learn It

It's not math and it's not a regular substantive course... it's statistics. Despite what many statistics teachers say, statistics is not math. It's also not a course like political science or biology. Statistics really includes elements of mathematics, substantive material, and a foreign language, and it is important to keep in mind the multifaceted nature of the topic. So, please try to keep an open mind. Don't approach the subject only as mathematics or only as a substantive course; you will miss more than half of what you need to learn. Here's my advice, which I hope will be helpful:

- **It's not like math, it is like math.** Statistics is considerably different from mathematics. In fact, the math required for this course is rarely more complex than what is needed to balance a check book. Statistics is like mathematics, however, in that it must be practiced to be learned. One has to work on exercises, analyze different problems, and get experience with different analytic situations in order to absorb the information. Do not think that you can just read through the material and remember everything. You may need to read and apply the material several times. *So, don't wait until the last minute!*
- **It's like a foreign language.** Statistics does, however, use a lot of symbols like Greek letters, and for this reason it is a bit like learning a foreign language. Think of the symbols as a foreign language vocabulary that has to be learned in order to understand the sentences.
- **It's like other courses.** In this course, there will also be a great deal of practical, conceptual, and other substantive information that will have to be learned; so, you will also have to read the text material, study concepts, and do some memorization like other substantive courses.
- **It's progressive.** Everything builds on everything else. Don't let any misunderstandings slip through the cracks, or it will snowball on you.
- **It's weird.** Statistics is a unique and unusual topic involving some very abstract and weird ideas. The peculiar nature of the subject makes the material very difficult to learn and retain. Despite its seemingly abstract nature, statistics are extremely useful tools that will make you a highly skilled and valued researcher.

A Note on Statisticophobia

Although not an official phobia, many of us have a real and unavoidable fear of all those numbers and Greek symbols. If you are a sufferer of *statisticophobia*, please don't worry, I fully understand how you feel. Also, remember that you are not alone, and I'll make sure you make it through the course. Believe it or not, most of you will actually wind up finding it interesting; at the very least, you will no longer have a morbid fear of it. I am always available to help, and your classmates can also be an excellent source of support. Chances are if you are having problems, so is someone else. *Please don't be afraid to ask for help!*

Web Page Material

I will post a page on my website, <http://www.upa.pdx.edu/IOA/newsom>, with links to a copy of the syllabus, homework assignments, data sets, and some of the handouts from class. You can also find supplementary lecture information on most of the topics we will cover under *Stats Notes*, accessed from the main page on my site. The information there was originally designed for a previous class and does not cover the topics in as much depth as I do in the current class. However, it should be useful overview information on most of the topics we cover this quarter.