

Course Syllabus USP 634 Data Analysis Spring 2011

Instructor

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Lab Instructor/Teaching Assistant

Kihong Kim, MPL. Office: 570s Urban Center (Transportation Modeling Lab). Email: kihong@pdx.edu. Phone: 213-284-2884. Office hours: by appointment.

Course Meeting Times

Tue, 4:00-6:30 pm, Urban Center 270. Lab meeting times: Tue 6:40-7:30 pm, Neuberger Hall 450.

Overview

This course is designed to give students the necessary skills to analyze research projects. Together with the second course (USP 654 Data Analysis II offered in the Fall), this course will be a thorough and reasonably comprehensive introduction to understanding, critically evaluating, conducting, and writing about analyses for most studies in social science-related disciplines.

Prerequisites

I assume that you have had some introduction to statistics as an undergraduate. (I realize for some of you, this may have been some years ago.) We will spend the first three weeks reviewing basic inferential statistics. You also should have some understanding of research designs. I will make available some optional readings that will help provide additional review if you need it.

Readings

Readings are from the required text and from supplemental articles and chapters. See attached schedule to be used as a guideline for when the readings should be completed. Note that you will get more out of class if the readings are complete prior to class meeting. Some students also prefer to revisit the readings after lectures, and I think this is a good strategy.

Grades

Your course grade will be based on three homework assignments and two exams, each component worth half of your course grade. **Exams** will include short answer (paragraph length), multiple choice, and computations/output interpretation. I will give you a one-page review sheet one week prior to the exam.

Homework assignments will include computer assignments, result summaries and interpretation, reading an example journal article, and some hand calculation problems. Homework assignments will be due at the beginning of class on the dates indicated on the schedule. No late assignments will be accepted, but if there are extenuating circumstances, such as illness or family emergency, please let me know as early as possible.

SPSS

Many of the assignments for this course will use a statistical software package called SPSS (Statistical Package for the Social Sciences). Recently they changed their name to PASW (for Predictive Analytics Software) for a brief period, so some versions may be labeled PASW instead of SPSS. SPSS is not the only statistical package available, and there are several other very good programs available (e.g., SAS, Stata, R). In the past, SPSS has been the most widely used package for social scientists, but this seems to be rapidly changing. The program is freely available at campus computer labs and it is perhaps the most user-friendly software available. An SPSS manual is not required for this class; everything you need to know about the program will be covered in class and lab and additional information is available under the help menu of the program. However, if you would like an additional reference, the following book is an accessible introduction to SPSS: Samuel B. Green & Neil J. Salkind (2008). *Using SPSS for the Windows and Macintosh: Analyzing and Understanding Data (Fifth Edition)*. Upper Saddle River, NJ: Prentice Hall. ISBN: 0136005969. You may be able to acquire the third or fourth edition 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; a calculator you get out of a cereal box will work just fine. It can be handy to have one with a summation function (Σ key), but it is not required.

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. 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 an Analysis of Variance, 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 realize its multifaceted nature. 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 no 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. Please see Kihong or me if you have questions!!
- **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 (yet), 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

The website for the class, <http://www.upa.pdx.edu/IOA/newsom/da1>, will have handouts and many overheads in pdf format (only after they are covered in class), the syllabus, supplemental readings, and links to useful statistics sites. Under "Stats Notes," there is also some additional lecture information on most of the topics covered in the course, although the material is discussed in less depth.

Course Schedule

Required Text

Myers, J.L., & Well, A.D., & Lorch, R.F., Jr. (2010). *Research design and statistical analysis* (3rd Edition). Mahwah, NJ: Erlbaum. ISBN: 978-0-8058-6431-1

Optional Text

Urduan, T. (2010) *Statistics in Plain English, 3rd Edition*. ISBN: 9780415872911

There will also be a few supplemental readings, which are listed below (*). These readings will be available for download from the course website. In addition to these topics, a number of other practical topics will be covered in class, including: issues related to using SPSS; data entry, cleaning, and management; secondary data sources and analysis; research design issues; and interpreting printouts.

When a main section number, such as 6.3, is listed as optional reading, this implies that subsections under the heading are also optional. For example, Sections 6.3.1 and 6.3.2 are also optional if Section 6.3 is listed.

General Topic	Class Dates	Reading Assignments	Optional Sections
Design	4/5	<ul style="list-style-type: none"> o *Schutt (2001), Chapter 6 o <i>Optional review readings: *Welkowitz, Ewen, & Cohen (1982) Chapter 4 Measures of Central Tendency, Chapter 5 Measures of Variability, Chapter 6 Transformed scores, Math reviews</i> 	<ul style="list-style-type: none"> o pp. 196-201. o All
Descriptive and inferential statistics	4/12	<ul style="list-style-type: none"> o Chapter 2: Exploring the data o Chapter 5: Further development of the foundations of statistical inference, <i>Sections 5.1 through 5.4 only</i> 	<ul style="list-style-type: none"> o 2.7 o 5.2.3 through 5.2.9
t-tests: Comparing two-groups with a continuous dependent variable	4/19	<ul style="list-style-type: none"> o Chapter 5: Further development of the foundations of statistical inference, <i>Sections 5.5 through 5.9 only</i> o Chapter 6: The t distribution and its applications 	<ul style="list-style-type: none"> o 5.6, 5.8 o 6.7, 6.8, 6.9
Homework 1 Due Tuesday, April 26			
Chi-square: Single and two-group comparisons when the dependent variable is dichotomous	4/26	<ul style="list-style-type: none"> o Chapter 4: Developing the fundamentals of hypothesis testing using the binomial distribution o *Welkowitz, Ewen, & Cohen (1982) Chapter 17, Chi Square 	<ul style="list-style-type: none"> o 4.3.2, 4.5 o None
Correlation and Reliability	5/3	<ul style="list-style-type: none"> o Chapter 2: Exploring the data, <i>Section 2.7 only</i> o Chapter 18: Introduction to correlation and regression o Chapter 19: Looking at data: Relations between quantitative variables, <i>Sections 19.1, 19.2, and 19.5 only.</i> o *Kaplan & Saccuzzo (1982) Chapter 4 Reliability 	<ul style="list-style-type: none"> o None o 18.5.3, 18.5.4, 18.6 o None o All technical boxes
Midterm Exam May 10			
One-way ANOVA and follow-up tests	5/10	<ul style="list-style-type: none"> o Chapter 8: Between-subjects designs: One factor o Chapter 10: Contrasting means in between-subjects designs 	<ul style="list-style-type: none"> o 8.3, Box 8.1, 8.5.3, 8.7, Box 8.3, Box 8.4 o 10.4, 10.10
Homework 2 Due Tuesday, May 17			
Factorial ANOVA and simple effects	5/17	<ul style="list-style-type: none"> o Chapter 9: Multifactor between-subjects designs o Chapter 10: Contrasting means in between-subjects designs, <i>section 10.10 only</i> 	<ul style="list-style-type: none"> o Box 9.1, 9.4, 9.5, 9.6.3, 9.7, 9.9, o None
Within-subjects ANOVA	5/24	<ul style="list-style-type: none"> o Chapter 14: One-factor repeated-measures designs 	<ul style="list-style-type: none"> o 14.2.1, 14.5.1, 14.8.3, 14.9
Homework 3 Due Tuesday, May 31			
ANOVA with Mixed Designs	5/31	<ul style="list-style-type: none"> o Chapter 15: Multi-factor repeated measures and mixed designs 	<ul style="list-style-type: none"> o 15.2.1, 15.2.3, 15.3.4, 15.4, 15.5, 15.6, 15.8.6, 15.9, 15.10
Final Exam, Tuesday, June 7, 3:30 –5:20 PM			