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Experimental Design and Analysis for Behavioral Research B9610-14

Spring 2012

Professor:

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Meeting time: Thursday, 2:15-5:30PM
Classroom: Uris 327

Course Objectives

This course is aimed at Ph.D. students who intent to conduct experimental and quasi-experimental research in business (e.g., marketing, organizational behavior) and related disciplines (e.g., economics, psychology). The primary objective of the course is to provide such students with the concepts and tools needed for collecting and analyzing behavioral data. A secondary objective is to provide these future academic reviewers the foundations for the methodological evaluation of other behavioral researchers' work. The course thus covers the designs and analyses that are most often used by experimental researchers in the following fields: marketing, organizational behavior, and psychology. Topics include: factorial designs, repeated (within-subject) and mixed designs, fractional (e.g., Latin squares) designs, analysis of covariance, etc.

We will examine these designs and analyses from the perspective of an applied behavioral researcher, not from that of a statistician. That is, we will emphasize the actual *use* of proper data collection procedures and analysis techniques for rigorous (i.e., publishable) theory testing. Although there will be sufficient coverage of statistical concepts (to ensure that the procedures and techniques are applied intelligently), we will not focus on statistical theory *per se* (as would related courses in a statistics department).

In addition to the objectives mentioned above, the course will offer students an opportunity to get started with the use of SAS, one of the most widely used statistical programming languages for manipulating and analyzing data. While this will not be a

course on SAS itself, students should become comfortable with this platform by the end of the course. This comfort will eventually allow them to move on to more complex applications using SAS (or similar languages).

Material

There are two required texts. Please arrange to obtain your own copy before the first class (e.g., through Amazon.com). I realize that these books are expensive. However, these are genuine investments that will pay off in your career. Additional readings will be distributed throughout the semester as well as a comprehensive set of teaching notes.

Keppel, Geoffrey and Thomas Wickens (2004), Design and Analysis: A Researcher's Handbook, 4th edition, Prentice Hall.

Cody, Ronald and Jeffrey Smith (2005), Applied Statistics and the SAS Programming Language, 5th edition, Prentice Hall.

Course Conduct

The class will be conducted in a seminar format. However, given the technical nature of the material, there will be a fair amount of lecturing and personal advice (and opinions) on my part. Still, it is primarily your responsibility to do whatever it takes to learn as much as you can from this class. Remember: It is not just about receiving a good grade; it is about acquiring fundamental skills to become rigorous (and hopefully successful) behavioral researchers.

Each session will have an analysis component and a design component. The analysis component will be based essentially on the Keppel and Wickens text (here after Keppel), and to a lesser extent on the Cody and Smith text (hereafter shortened as SAS). Assigned chapters should be read before each class. At the end of each class selected exercises from the texts will be assigned to reinforce the analysis concepts covered. There will also be two take-home exams that will test your ability to analyze experimental data.

I believe that design skills can only be taught through (good and bad) examples; the more, the better. The design component will thus draw on additional readings, discussions of existing published and unpublished studies, as well as on personal experiences and opinions. You will receive several written assignments requiring that you evaluate other researchers' designs.

These course components and assignments will be weighted as follows:

Short Exercises (15%). These will be selected from the text and assigned after each class. They will focus on the analysis component of the class.

Take-Home Analysis Exam (40%): There will be two take-home exams, which are in fact open-notes assignments. These assignments will also focus on the analysis aspect of the course. You will be asked to complete entire data analyses of different types of experiments. The dates will be announced later in the term.

Design and Analysis Evaluation (25%). You will be asked to evaluate the design and analyses performed by other researchers and suggest improvements as if you were a reviewer.

Participation (20%): Please be punctual in coming to class and turning in your assignments. We will devote about two hours in each class to design issues. This part of the session will be more open-ended. You should therefore feel free to bring up design issues that you are confronted with in your current research. Also feel free to discuss designs that you came across in your own readings. That way, everybody will get a chance to be exposed to a wide variety of designs. You will be graded based on your overall contribution to this discussion, both as a problem raiser and a problem solver..

Other recommended references:

Abelson (1995), *Statistics as Principled Argument*, Lawrence Erlbaum Associates.

Spector (1993), *SAS Programming for Researchers and Social Scientists*, Sage.

SAS Institute Inc., *SAS User's Guide: Basics*, Cary, NC: SAS Institute Inc.

SAS Institute Inc., *SAS/STAT User's Guide Volume 1*, Cary, NC: SAS Institute Inc.

SAS Institute Inc., *SAS/STAT User's Guide Volume 2*, Cary, NC: SAS Institute Inc.

NOTE: MAKE SURE TO GET THE BOOKS AND COMPLETE THE ASSIGNMENTS FOR CLASS 1. (We cannot afford to lose a class session.)

Topic	Readings (*Articles to be critiqued are only tentative)	Assignment	Date (Tentative)
1. Introduction to Experimental Design and Data Analysis with SAS	▪ Keppel: Ch. 1 ▪ Kirk: Ch 1 ▪ SAS: Ch. 1, 12 ▪ Lee (2000)* ▪ Pham et al. (2001)*	▪ Setup computer account that can run SAS ▪ Do SAS problems 12-1, 12-2, 12-3, 1-1	R01/26/12
2. Foundations of ANOVA, One-way ANOVA, & ANOVA Assumptions	▪ Keppel: Ch. 2, 3, & 7 ▪ SAS: Ch. 2 & 13 ▪ Cialdini et al. (1976)* ▪ JMR Submission*	▪ Keppel 2.1 (a,b,c) ▪ Note 1.10 (meaningful contrasts) ▪ SAS 2-3; 2-4	R02/02/12
3. Planned Comparisons & Trend Analysis	▪ Keppel: Ch. 4-5 ▪ SAS: Ch. 7 (section A-C) ▪ Dissociative Consumption version 1 ▪ Howard et al. (1995) ▪ Pham & Vanhuele (1997)	▪ Keppel 3.5 (b), 7.1 ▪ SAS 7-1	R02/09/12
4. Post-Hoc Comparisons & Effect Size & Power	▪ Keppel: Ch. 6 & 8 ▪ Fern and Monroe (1996); ▪ Prentice and Miller (1992) ▪ SAS: Ch. 14 ▪ Ariely (2000)	▪ Keppel 4.1, 4.4, 5.3 ▪ SAS 14-1, 14-2, 14-3, 14-4	R02/23/12
5. Between-Subjects Factorial Designs-Part 1	▪ Keppel: Ch. 10-12 ▪ SAS: Ch. 7 (sections D & E), 17 ▪ IJRM Focus & MinMax Goals ▪ Pham et al. (forthcoming) ▪ Manucia et al. (1984)	▪ Keppel 8.3, 8.6 ▪ Effect size interpretation (Notebook p. 28) ▪ SAS 17-1, 17-3	
Mid-term Exam			
6. Between-Subjects Factorial Designs-Part 2	▪ Keppel: Ch. 13, 21 & 22 ▪ SAS: Ch. 7 (section G) ▪ Pham (1998) ▪ Zhou & Pham (2004)	▪ Keppel 11.1, 12.3 ▪ Do above problems in SAS as well	

Topic	Readings	Assignment	Date (Tentative)
7. Introduction to Within-Subjects Designs: One-way repeated ANOVA	▪ Keppel: Ch. 16 ▪ SAS: Ch. 8 (sections A-C) ▪ Greenwald (1976)	▪ Keppel 13.5, 21.3, 22.3 ▪ SAS 8-1, 8-2	
8. Factorial Within-Subjects Designs	▪ Keppel: Ch. 18 ▪ SAS: Ch. 8 (section E)	▪ Keppel 16.1 (a) ▪ Do same as above in SAS	
9. Mixed Designs (I)	▪ Keppel: Ch. 19 ▪ SAS: Ch. 8 (sections D, F, G) ▪ Muthukrishnan et al (2001) ▪ Pham et al (forthcoming)	▪ Keppel 19.2	
10. Mixed Designs (2), Block Designs, Continuous Predictors	▪ Keppel: Ch. 20 ▪ SAS: Ch. 7 (section H) ▪ Pham, Meyvis, & Zhou (2001)	TBA	
11. Analysis of Covariance & Tests for Mediation	▪ Keppel: Ch. 15 ▪ Baron and Kenny (1986) ▪ Spencer, Zanna, & Fong (2005) ▪ Pham & Muthukrishnan (2002)	TBA	
12. Latin-Squares and Fractional Designs	▪ TBA ▪ Wagenaar (1969)	TBA	
Final Exam			