**Psychology 252: Statistical Methods for Behavioral and Social Sciences**  
MWF 1:15 -- 2:45; Bldg 60, Rm 61H

**Instructors**

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Section: M 5:30-7:00

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Section: M 5:30-7:00

**Overview**

This course will cover data analysis procedures and the mathematical models that underlie them, with special reference to the techniques of analysis of variance (ANOVA) and multiple regression.

**Main Text**


**Auxiliary ‘Text’ & SPSS**

Green & Salkind, *Using SPSS*, 4th Edition, 2004, Duxbury. (SPSS) [The 3rd ed. is OK.] Note that for a small amount more than the price of the text, you can get the Student Version of SPSS 13.0 for Windows when ordered in Value Packages with the text. For those students who will not have access to SPSS on their own computers, please note that there are computers with SPSS in the public access terminal rooms in the Psychology Dept. (and probably in the School of Education and the Communication Dept.).

**Grading**

Your overall course grade will be based on some (not all) of the Homework (HW) assignments, three approximately biweekly quizzes, and a final exam. Some of these tests will be take-home tests. The Final exam is worth 30% of the grade, and the graded HW and the three quizzes are each worth a quarter of the remaining 70%.

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<thead>
<tr>
<th>Exam</th>
<th>Weighting</th>
<th>Date</th>
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<tbody>
<tr>
<td>Quiz I</td>
<td>17.5%</td>
<td>Handed out F, 10/7, due W, 10/12</td>
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<tr>
<td>Quiz II</td>
<td>17.5%</td>
<td>given in class on W, 10/26</td>
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<tr>
<td>Quiz III</td>
<td>17.5%</td>
<td>given in class on W, 11/16</td>
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<td>HW subset</td>
<td>17.5%</td>
<td>due at times to be stated</td>
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<tr>
<td>Final Exam</td>
<td>30.0%</td>
<td>handed out F, 12/9, due W, 12/14</td>
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Outline

I. Introduction
   (A) A mindset for analyzing large data sets (SPSS, Units 1-5; Lessons 38-40. Howell, Ch. 1, 2; 6.3-6.5)
      1. Variables in samples & populations; the ‘pam.dat’ data set
      2. Indices of location & dispersion for qualitative & quantitative variables
      3. Chi-square goodness-of-fit & contingency tests; SPSS preliminaries
   (B) Probability Theory (Howell, Ch. 5)
      1. Probability - unconditional, conditional and joint; Bayes’ Theorem
      2. Probability distributions of discrete & continuous variables
   (C) Sampling distributions and hypothesis testing (Howell, Ch. 3 & 4)
      1. Expected value and variance of random variables; sums of random variables
      2. Binomial and Normal distributions; the Central Limit Theorem
      3. Null & alternative hypotheses; Type I and Type II errors; 1- & 2-tailed tests; effect size
   (D) Z- and t- and Sign-tests (Howell, Ch. 7 & 8)
      1. Inference for 1 population mean
      2. Inference for 2 means: Related & Unrelated groups
      3. Power

II. Analysis of Variance and Experimental Designs (Howell, Ch. 11-13)
   (A) Single Factor ANOVA
      1. One-way analysis of variance
      2. Multiple comparisons in one-factor ANOVA
      3. Design issues: determining sample size and power
      4. Model violations & nonparametric alternatives
   (B) Factorial Designs
      1. Two-way & three-way fixed effects ANOVA
      2. Fixed, random, and mixed models
      3. Multiple comparisons in two-factor ANOVA
      4. Randomized block design (i.e., 2-way without interaction)

III. Correlation and Regression
   (A) Correlation and simple straight-line regression (Howell, Ch. 5)
      1. Formulae for covariance, correlation, regression line, s.e. of prediction
      2. Assumptions, diagnostics and transformations
   (B) Multiple regression & diagnostics (Howell, Ch. 15)
      1. Polynomial regression
      2. Logistic regression (with a qualitative dependent variable)
   (C) Regression Models with Categorical Predictors: GLM (Howell, Ch. 16)
      1. Dummy coding for (unbalanced) ANOVA designs
      2. Analysis of covariance (ANCOVA)

IV. Advanced topics
   (A) ANOVA: nested, repeated measures designs
   (B) Building Regression Models
      1. Variable selection: Best subsets regression
      2. Mediation (Path) analysis

Computer

The statistical package SPSS will be used in this course. In addition, there is a class directory in Coursework
(https://coursework-e.stanford.edu/coursework/), where you will find homework sets, as well as other miscellaneous files (e.g. data sets, data analysis examples, etc.). If you do not have a computer account, please see one of the instructors after class. Handouts with some computer tips will be available. Computer issues will also be addressed by the TAs.

**Homework**

Problem sets will be handed out at least once a week. Some will be designated as “HW to be graded” and are to be submitted by the “due date.” Solutions will be provided either in the class directory or by hard copy. The remaining problem sets, some of them probably longer than necessary to give you a good command of the subject, are offered as useful exercises; these do not have to be submitted. You are encouraged to work in groups on all the problem sets. However, the work you **submit for grading** should be written up independently, even if you worked in a group on it. Assignments will (often) be posted as files 05h*.ass and solutions as 05h*.sol in the class directory.

**Honor Code**

Each of us should do our utmost to uphold Stanford University’s Honor Code (posted on the Coursework site). You should not give or receive help from anyone on the quizzes. In the event that something on a quiz is unclear, you are encouraged to contact one of the instructors about it. As stated in the previous paragraph, you are encouraged to work in groups on homework assignments; by all means, teach and learn from each other! However, the homework solutions you submit should be written up independently.

**Other Comments**

1. The TAs will lead a weekly discussion section on Mondays in Rm. 050, Bldg 420 (Psychology).
2. Enrollment in the course is approved for six units. Of course, students may enroll for 5 units or less.