Psych. 501 INTRODUCTORY STATISTICS

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Text: Wilcox, R. R. (2011) *Modern Statistics for the Social and Behavioral Sciences: A Practical Introduction.* New York: Chapman & Hall/CRC press.

The primary goal is to provide a strong foundation for understanding and applying basic statistical techniques. A detailed outline of the material is given below. The basics include sampling distributions, expected values, hypothesis testing, the difference between parameters and statistics, least squares regression and correlation, and the basics of probability theory. No prior training in statistics is assumed. Classic methods are covered as well as some modern methods developed during the last half century that are aimed at dealing with skewed distributions, heavy-tailed distributions and heteroscedasticity.

This course covers chapters 1-9 in the text. Time permitting, portions of chapters 10 and 11 (ANOVA) will be covered.

There are three exams: two midterms and a final. Each test accounts for 30% of your grade. The computer lab is mandatory and counts for 10% of your grade. There is a possible 100 points for the course. A grade of A requires 92 or higher, 90-91 is A-, 88-89 is B+, 82-87 is a B, 80-81 a B-, 78-79 is a C+, etc.

Consequently, if you don't do the computer assignments, you can get an A- only if you get perfect scores on all of the exams.

A quiz is given after each chapter is covered in class. It is graded pass/fail. If you fail, you can hand in a take-home make-up quiz and get a pass. The quizzes can raise your grade but they can't lower it. You get a bonus point added to each exam if you do all of them prior to exam being given.

The first test will be on chapters 1-3 and will be given during the fifth week of the semester. So if you complete the quizzes prior to week 5, you get a bonus point on the exam. The second exam is on chapters 4-6 and will be given during the tenth week, and the final will cover chapters 7-9.

THE FINAL IS GIVEN ON THE DAY INDICATED BY THE SCHEDULE OF CLASSES. THERE ARE NO EXCEPTIONS.

The final exam is Dec 13, 8AM

Weekly layout:

week 1: Chapter 1 + Sections 2.1-2.4

week 2: Sections 2.5-2.10

week 3: Quiz, ch. 2, Sections 3.1-3.6 week 4: Sections 3.7-3.8, Quiz Ch 3.

week 5: Section 4.1-4.2, exam

week 6: Sections 4.3-4.9

week 7: Sections 4.10-4.13, 5.1-5.6 quiz ch 4

week 8: Sections 6.1-6.3, quiz ch 5

week 9: Sections 6.4-6.6, quiz ch 6

week 10: 7.1-7.2, exam

week 11: sections 7.3-7.6

week 12: 7.7-7.8, 8.1-8.3, quiz ch 7

week 13: 8.4-8.9

week 14: 8.10-8.13

week 15: 9.1-9.2, 10.1 and 12.1, review.

A MORE DETAILED OUTLINE OF THE MATERIAL:

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1 INTRODUCTION

BROAD OVERVIEW
 Samples versus Populations
 Software
 R Basics (The book illustrates how to apply standard methods)

2 NUMERICAL AND GRAPHICAL SUMMARIES OF DATA
Basic Notation
Measures of Location
The Sample Mean: Issues related to skewness and outliers
The Sample Median
Criticisms of the Median and Two General Strategies for Dealing with these Concerns
Measures of Variation or Scale
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Sample Variance and Standard Deviation
The Interquartile Range
Robust measures of variation that have practical value.
Detecting Outliers
       A method based on the mean and variance and
       why it is generally considered to be unsatisfactory.
       Better Outlier Detection Rules (boxplot and MAD-median rules)
Measures of Location based on the strategy of removing outliers
Histograms and modern improvements
Stem-and-Leaf Displays
Skewness
Transforming Data
    By modern standards, an ineffective method for dealing with skewness
    and outliers
Choosing a Measure of Location

3 PROBABILITY AND RELATED CONCEPTS
Basic Probability
Expected Values
Conditional Probability and Independence
Population Variance
The Binomial Probability Function
Continuous Variables and the Normal Curve
Computing Probabilities Associated with Normal Curves
Understanding the Effects of Non-normality:
   Skewness and Heavy-Tailed Distributions
Pearson's Correlation and the Population Covariance
Computing the Population Covariance and Pearson's Correlation
Some Rules About Expected Values
Chi-Squared Distribution

4 SAMPLING DISTRIBUTIONS AND CONFIDENCE INTERVALS
Random Sampling
Sampling Distributions
Sampling Distribution of the Sample Mean
Computing Probabilities Associated with the Sample Mean
A Confidence Interval for the Population Mean Known Variance
Confidence Interval for the Population Mean Using Student's t
Relative Merits of Various Location Estimators
The Central Limit Theorem
Student's t, Non-normality and Common Misconceptions
Dealing with Skewness and Heavy-tailed Distributions

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Wilcoxon-Mann-Whitney Test
         Handling Tied Values and Heteroscedasticity
The Kolmogorov-Smirnov Test
Comparing All Quantiles Simultaneously
Graphical Methods for Comparing Groups
   Error Bars
   Plotting the Shift Function
   Plotting the Distributions
Methods for Comparing Measures of Variation
Comparing Robust Measures of Variation
Measuring Effect Size
Comparing Correlations and Regression Slopes
Comparing Two Binomials
Making Decisions About Which Method To Use

9 COMPARING TWO DEPENDENT GROUPS
The Paired T Test
 When Does the Paired T Test Perform Well?
     Understanding When and Why It Can Perform Poorly.
Comparing Robust Measures of Location
Handling Missing Values
The Sign Test
Wilcoxon Signed Rank Test
Comparing Variances
Comparing Robust Measures of Scale
Comparing Quantiles
Plots for Dependent Groups

10 and 12. Basic ANOVA.
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at: http://www.usc.edu/student-affairs/SJACS/.

Students who need to request accommodations based on a disability are required to register each semester with the Disability Services and Programs. In addition, a letter of verification to the instructor from the Disability Services and Programs is needed for the semester you are enrolled in this course. If you have any questions concerning this procedure, please contact the course instructor and Disability Services and Programs at (213) 740-0776, STU 301.