COURSE NUMBER: SOWO 911
COURSE TITLE, SEMESTER AND YEAR: INTRODUCTION TO SOCIAL STATISTICS AND DATA ANALYSIS, FALL 2009
INSTRUCTOR: Rebecca J. Macy, PhD, ACSW, LCSW
School of Social Work
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OFFICE HOURS: Thursdays 12.30pm-2pm

COURSE DESCRIPTION: This course is designed to explore basic principles and to provide advanced instruction in data analysis, including the construction and analysis of tables, the graphical analysis of data, the use of statistical tests, the application of univariate, bivariate statistics and ANOVA models to social work research, and the use of software programs to analyze data.

COURSE OBJECTIVES: At the completion of this course, students will be able to:
1. Use a computing software package to create, manage, and analyze data relevant to social behavioral research;
2. Have a solid understanding of normal distribution, and apply it to inference of population mean by conducting univariate z test and t test;
3. Know how to develop research hypothesis, and convert such hypothesis into a null hypothesis to conduct tests on statistical significance; understand type I and II errors and factors affecting statistical power;
4. Understand the central limit theorem and other sampling theories, and the application of this knowledge to assessing strengths and limitations of probability and nonprobability samples commonly found in social behavioral research;
5. Understand chi-square distribution and apply it to analysis of contingency table involving two or more categorical variables;
6. Understand correlation and apply it to evaluation of associations between continuous variables;
7. Know how to perform independent sample t test, paired t test, one-way between subject analysis of variance (ANOVA), one-way within-subject ANOVA, and two-factor ANOVA to answer research questions relevant to social behavioral data;
8. Know how to interpret results of statistical analysis, and communicate findings to general audiences clearly and effectively in writing;
9. Have general knowledge about non-normal distributions (Bernoulli, binomial, exponential and exponential family, and multinomial) to get read for learning advanced statistics courses;
10. Have general knowledge about matrix algebra to get ready for learning advanced statistics courses.
REQUIRED TEXTS/READINGS:

Getting the Books and Readings: The textbooks are available at the Student Bookstore and the usual bookstore websites. The instructor will make any additional readings available to students throughout the course through the course’s blackboard website.

CLASS ASSIGNMENTS
- Homework assignments: 24% (8 homework assignments at 3% each)
- Analysis and critique presentation: 20%
- Mid-term exam: 26%
- Final exam: 30%
- Please put your PID number- not your name- on any written work, assignments or exams you turn into me (the instructor). This will allow me to evaluate student work as fairly as possible.

GRADING SYSTEM
H = 94-100
P = 80-93
L = 70-79
F = 69 and below

POLICY ON INCOMPLETES AND LATE ASSIGNMENTS
A grade of “Incomplete” will be given only in extenuating circumstances and in accordance with School of Social Work and University policy. Assignments are due in class on the day as noted in the course outline. Late assignments, i.e., those not handed in to me in class on the day due, will be reduced 10 points for each day they are late. Please plan your work to have things completed on time. If problems or questions arise as you are completing your assignments, please contact me as soon as possible. Many potential complications can be solved through communication with me.

POLICY ON ACADEMIC DISHONESTY
Please refer to the *APA Style Guide*, The SSW *Manual*, and the SSW Writing Guide for information on attribution of quotes, plagiarism and appropriate use of assistance in preparing assignments. All written assignments should contain a signed pledge from you stating that, "I have not given or received unauthorized aid in preparing this written work."

In keeping with the UNC Honor Code, if reason exists to believe that academic dishonesty has occurred, a referral will be made to the Office of the Student Attorney General for investigation and further action as required.
POLICY ON ACCOMMODATIONS FOR STUDENTS WITH DISABILITIES
Students with disabilities that affect their participation in the course and who wish to have special accommodations should contact the University’s Disabilities Services and provide documentation of their disability. Disabilities Services will notify the instructor that the student has a documented disability and may require accommodations. Students should discuss the specific accommodations they require (e.g. changes in instructional format, examination format) directly with the instructor.

POLICIES ON THE USE OF ELECTRONIC DEVICES IN THE CLASSROOM
Students may use laptops or other electronic devices (e.g., PDA) for activities related to classroom learning, such as note taking. However, use of electronic devices for non-class related activities (e.g. checking email, playing games) is prohibited. Please do not use electronic devices to record classroom lectures or discussion without first seeking permission from the instructor.

Students are strongly encouraged to use and bring calculators for class and exam sessions.

OTHER POLICIES/GENERAL INFORMATION
Instructor’s Use of Power Point: I will use power point presentation as part of the in-class activities. All power point presentations will be posted prior to the class meeting on our Blackboard website.
Course website: The course website is available through https://blackboard.unc.edu
Course evaluation: Student ideas about the course are important to me and can help improve learning and the course experience for all of us. I will provide a survey at the mid-point of the course, so you can give me ideas and suggestions about the course. You will also be given an opportunity to evaluate the course at the end of the term.
1) AUGUST 27: Course Introduction, Science & Statistics, Frequency Distributions
- Instructor and student introductions, course expectations
- Review of syllabus and assignments
- Measurement
- Frequency Distributions

Required reading:
- In Kiess & Green: Chapter 3, *Looking at Data: Frequency Distributions and Graphs*, pp. 36-69
- In Kiess & Green: Chapter 4, *Looking at Data: Measures of Central Tendency*, pp. 70-85
- In Kiess & Green: Chapter 5, *Looking at Data: Measures of Variability*, pp. 86-104

Recommended reading:
- In Kiess & Green: Chapter 1, *Making Sense of Variability: An Introduction to Statistics*, pp. 1-16
- In Kiess & Green: APPENDIX A: *Mathematics Review*, pp. 484-489 (*Please note: this is a helpful review of basic mathematical operations*)

2) SEPTEMBER 3: Normal Distribution, Probability, Inference and Estimation
- HOMEWORK ASSIGNMENT #1 DUE AT THE BEGINNING OF CLASS
- Normal Distribution
- Probability
- Inference and Estimation
- STATA LAB SESSION: DESCRIPTIVE STATISTICS & DISTRIBUTIONS

Required reading:
- In Kiess & Green: Chapter 6, *Normal Distribution, Probability and Standard Scores*, pp. 105-134
- In Kiess & Green: Chapter 7, *Understanding Data: Using Statistics for Inference and Estimation*, pp. 135-158

Recommended reading:
- In Acock: Chapters 1, 2, 3, 4, & 5 pp. 1-107 (*I recommend reading these chapters over the first few weeks of the course*)
3) SEPTEMBER 10: Investigating Differences
   • HOMEWORK ASSIGNMENT #2 DUE AT THE BEGINNING OF CLASS
   • z-tests and hypothesis testing
   • Introduction to t-tests

   Required reading:
   In Kiess: Chapter 8, *Introduction to Statistical Hypothesis Testing*, pp. 159-190

4) SEPTEMBER 17: More on Investigating Differences
   • HOMEWORK ASSIGNMENT #3 DUE AT THE BEGINNING OF CLASS
   • t-tests
   • STATA LAB SESSION: t-TESTS

   Required reading:
   In Kiess: Chapter 8, *Introduction to Statistical Hypothesis Testing*, pp. 159-190

   Recommended reading:
   In Acock: Chapter 7, *Test for One or Two Means*, pp. 131-160

5) SEPTEMBER 24: Mid-term Review
   • HOMEWORK ASSIGNMENT #4 DUE AT THE BEGINNING OF CLASS
   • No required reading
   • Homework: Prepare for the Mid-Term

6) OCTOBER 1: IN-CLASS MID-TERM EXAM

7) OCTOBER 8: Investigating Differences: ANOVA
   • One-Factor Between-Subjects and Analysis of Variance

   Required reading:
   In Kiess: Chapter 10, *One-Factor Between-Subjects and Analysis of Variance*, pp. 238-281
8) OCTOBER 15: Investigating Differences: More on ANOVA
- HOMEWORK ASSIGNMENT #5 DUE AT THE BEGINNING OF CLASS
- One-Factor Within-Subjects Design and Analysis of Variance
- STATA LAB SESSION: ANOVA

Required reading:
In Kiess: Chapter 12, One-Factor Within-Subjects Design and Analysis of Variance, pp. 337-368

Recommended reading:
In Acock: Chapter 9, Analysis of Variance (ANOVA), pp. 183-218

9) OCTOBER 29: Investigating Differences: Even more on ANOVA
- HOMEWORK ASSIGNMENT #6 DUE AT THE BEGINNING OF CLASS
- Two-Factor Between Subjects Designs and Analysis of Variance
- STATA LAB SESSION: DATA MANAGEMENT

Required reading:
In Kiess: Chapter 11, Two-Factor Between-Subjects Design and Analysis of Variance, pp. 282-336

10) November 5: Investigating Associations: Correlations
- Correlation
- STATA LAB SESSION: CORRELATION

Required reading:
In Kiess: Chapter 13, Correlation, pp. 369-408

Recommended reading:
In Acock: Chapter 8, Bivariate Correlation and Regression, pp. 161-182 (Please focus on the correlation part of this chapter!)
11) NOVEMBER 12: Investigating Associations: Chi-Square
• HOMEWORK ASSIGNMENT #7 DUE AT THE BEGINNING OF CLASS
• Nonparametric Statistical Tests with focus on Chi-Square
• A very basic introduction to non-normal distributions
• STATA LAB SESSION: CHI-SQUARE

Required reading:
In Kiess: Chapter 15, Nonparametric Statistical Tests, pp. 447-482

Recommended reading:
Acock: Chapter 6, Statistics and Graphs for Two Categorical Variables, pp. 109-130

12) NOVEMBER 19: Analysis and Critique of Statistics in Social Work Research Presentations
• This course will be used for student presentations for this assignment
• Strategies for manuscript writing: drafting a results section of a statistical analysis

13) DECEMBER 3: Final Review
• HOMEWORK ASSIGNMENT #8 DUE AT THE BEGINNING OF CLASS
• Review for final exam
• Course evaluations
Assignments: Additional Information

Homework
Your homework assignments for each week will be posted on our course blackboard website. Completing the homework assignments each week will help you master the course content. Here are some tips that will help you do well on the homework assignments:

- Have the homework ready to turn into me (the instructor) by the beginning of the class session that it is due.
- When the instructions state that it is necessary to do the homework problem by hand, please do the statistical analyzes for that homework question by hand! You may use a calculator for addition, subtraction, and so on. However, do not use a statistical programs to conduct the statistical analyzes unless the homework assignment directs you to do so. This course provides the foundation on which you will build your statistical skills. By doing the statistical problems by hand, you will gain a solid understanding of the basics. This solid understanding will serve you well as you take advanced statistical coursework.
- When you do problem by hand, you may hand write your homework assignment (rather than typing the homework), but please be neat in your presentation, so I can read your writing! 😊
- When the homework instructions state that it is necessary to complete the homework problem in STATA, please complete the homework problem in STATA. When you have completed your calculations, print the output to turn into the instructor.
- Of course, in the homework, show the answers to the statistical analysis problems. In addition, (and more importantly!) show how you got the answer (i.e., show your steps and work) as much as possible.
**Analysis and Critique Presentation**

For this assignment you will pair up with a member of the class to analyze and critique a social work research article, which uses one of the statistical tests we study in this course. The aim of this assignment is to help develop your capacity to critical analyze the use of statistical tests in social work research, as well as develop your capacity to give oral presentations.

**Assignment tasks:**

1) Find a peer-reviewed, social work journal article, in which the authors present a statistical analysis that we study in this course. (I am happy to review articles that you find for their appropriateness to help you decide if this article will work well for the assignment.)

2) Closely read, analyze, and critique the statistical analysis presented in the article. Consider the following issues:

   - What are the authors' research questions? Hypothesis/hypotheses?
   - How were the questions and/or hypotheses developed? Were they informed by theory? By substantive issues and/or concerns?
   - What statistical tests do the authors use? What is their rationale of that particular test? Is the rationale well explicated? justified? Is it consistent with the theory and/or substantive presented in the article?
   - Is the statistical test appropriate? That is, can the authors answer their research question by using this test? Is the test appropriate given their data? Their sample? Power?
   - What are the findings? To what extent to the findings following from the research question(s) and the analyzes? Do you find any errors or problems with the findings?
   - If relevant, consider the effect size of the findings. Is the effect size statistically meaningful? Clinically meaningful?
   - What are the article’s conclusions? Are the conclusions appropriate given the findings?
   - What were the strengths of the statistical analysis? What were the limitations?
   - What recommendations would you give the authors for improving their study and analysis?
   - If you were the peer-reviewer for this paper would you recommend it for publication? Why or why not?

3) Prepare a brief (15 minutes) power point presentation on the article in which you will present the article, as well as your analysis and critique of the authors’ statistical analysis.

4) Give your presentation to the instructor and your classmates in class on 11/15/2007; be prepared to turn-in a copy of your power point slides and the article to the instructor.

**Grading Criteria for this Assignment:**

**Analysis:** To what extent did the presentation provide a thoughtful and complete analysis of the article (30 points)?
• Presentation described the article’s research questions and/or hypothesis/hypotheses.
• Presentation described the extent to which the research questions and/or hypotheses were informed by theory and/or substantive issues.
• Presentation described statistical test(s) used and the extent which the authors provided a rationale for the statistical test(s).
• Presentation fully described article’s findings.
• Presentation described the extent to which the findings are statistically and clinically meaningful, and (as relevant) the effect size of the findings.
• Presentation fully described the article’s conclusions.

Critique: To what extent did the presentation provide a thoughtful and complete critique of the article (40 points)?
• Presentation analyzed the article’s statistical rationale and the extent to which the rationale is consistent with the theory and/or substantive issues noted in the article.
• Presentation discussed the extent to which the statistical tests were appropriate (e.g., can authors answer their research question by using this test? Is the test appropriate given their data? Their sample? Power?)
• Presentation discussed the extent to which the article’s conclusions were appropriate given the findings.
• Presentation discussed the strengths and limitations of the statistical analysis.
• Presentation provided recommendations for improving the study and/or statistical analysis.

Presentation: To what extent did the presenters successfully communicate the analysis and critique (30 points)?
• Presentation was clear and coherent.
• Presenters were able to address audience questions and/or elicit discussion.
• Presentation was concise; presenters stayed within the presentation time frame.
• Presentation made effective use of power point slides/presentations.