

Statistics for Social Science

MEJO 704.001



Fall 2022 Semester Information

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Site URL: <https://sakai.unc.edu/portal/site/mejo704f22>

Course Summary

This course is the first of a two-course series on the application of statistical tests for addressing hypotheses and research questions typical of quantitative social science research. Lessons in this course include the calculation and interpretation of descriptive statistics, t -tests, analyses of variance, internal reliability analyses, and an introduction to linear regression. This first course is rooted in practice with real data sets using SPSS as the statistical platform, although some hand calculations involving basic algebra will be required. By the end, students will understand how to match appropriate statistical tests with the types of variables available and research questions (or hypotheses) posed, and they will be prepared to expand their current knowledge in applied statistics.

Course Goals

The Hussman School of Journalism and Media follows the student learning outcomes derived by the professional values and competencies listed by the Accrediting Council on Education in Journalism and Mass Communications. [Click here to learn more.](#)

This course addresses the following values and competencies:

- Understand concepts and apply theories in the use and presentation of images and information.
- Conduct research and evaluate information by methods appropriate to the communications professions in which they work.
- Apply basic numerical and statistical concepts.

These above values and competencies are addressed through the specific student learning objectives of this course as follows:

Students will demonstrate an understanding of how the theoretical and probabilistic foundations of statistics limit how a test can be used to support a hypothesis or argument by:

- (1) Using the appropriate language for indicating how statistical tests inform the researcher's study;
- (2) Identifying connections between the theoretical foundations of statistical tests and the information provided in the statistics output;
- (3) Interpreting and explaining test results based on the theoretical assumptions of the given test.

Students will demonstrate an understanding of p-values and statistical significance by:

- (1) Interpreting and explaining the implications of a statistical result and differentiating between statistical significance, social significance, and magnitude of an effect;
- (2) Illustrating the concept of p-values in graphical form;
- (3) Demonstrating how a p-value can be altered based on choices made in conducting statistical analyses.

Students will understand the basic structure of the common statistical tests used in social sciences and how these tests connect by:

- (1) Identifying and describing the basic components of different statistical tests;

- (2) Identifying commonalities across tests, namely how certain concepts are represented in the equations of different statistical tests;
- (3) Performing statistical tests by hand using a given equation.

Students will 'diagnose' research designs and 'prescribe' the most appropriate type of statistical test based on the research question(s) and types of variables used by:

- (1) Identifying variables based on their unit of measurement;
- (2) Identifying different statistical tests based on their treatment of variables;
- (3) Demonstrating appropriate selection of a statistical test, given a research question (or hypothesis) and the variables involved.

Students will perform basic descriptive and inferential statistics, including:

- (1) Describing data using:
 - Frequencies
 - Measures of central tendency: Mode, Median, Mean
 - Measures of dispersion: Range, Variance, Standard Deviation
- (2) Visualizing data using:
 - Histograms
 - Box plots
 - Scatterplots
- (3) Analyzing data using the following tests:
 - Chi-square analyses
 - Parametric *t*-tests
 - One-way analyses of variance and common post-hoc tests
 - Two-way (2X2 and 3X2) analyses of variance and common post-hoc tests
 - Covariance and correlation
 - Cronbach's alpha
 - Familiarity with simple and multiple linear regression.

Students will improve their ability to become a more self-directed learner of statistics by:

- (1) Feeling more confident in their ability to understand how to interpret statistical equations.

Approaching the Course

Statistics, like learning other forms of mathematics or other languages, builds off itself and requires constant practice to reinforce prior concepts or procedures in order to learn the next concept or procedure.

To succeed in this course, it is important to keep up, as much as possible, with reviewing slides of each lesson module as needed (see course schedule at the end of this syllabus) and complete the graded and ungraded activities intended to help you practice each lesson. The points that can be accumulated for the evaluation of course performance are designed with the idea of constant practice in mind.

As instructor, I also make a commitment to create an engaging, safe, and inclusive space to teach this course and provide ample feedback throughout the semester. To this end, I am available for one-on-one assistance, tutoring, or review and pledge to work with you to find the best ways of explaining each lesson in a way that resonates with you.

Evaluating Course Performance

Performance in this course is evaluated using points accumulated from graded assignments (quizzes and homework) and a final exam, as well as points accumulated through completion-only activities. Points allotted to each type of activity is presented below.

In all cases, the assignment, activity, or exam is expected to be completed by the beginning of class on the date it is due. Due dates are listed in the first column of the course schedule that follows.

Attendance

University Policy:

No right or privilege exists that permits a student to be absent from any class meetings, except for these University Approved Absences:

1. Authorized University activities
2. Disability/religious observance/pregnancy, as required by law and approved by [Accessibility Resources and Service](#) and/or the [Equal Opportunity and Compliance Office](#) (EOC)
3. Significant health condition and/or personal/family emergency as approved by the [Office of the Dean of Students](#), [Gender Violence](#)

[Service Coordinators](#), and/or the [Equal Opportunity and Compliance Office](#) (EOC).

Please be aware that you are bound by the [Honor Code](#) when making a request for a University approved absence.

Class Policy:

Because statistics is cumulative and requires practice, attendance is important for keeping up with the content in this course. If you experience a hardship during this semester that keeps you from being able to attend class, please let me know immediately and we will come up with a plan to address the situation.

If not addressed through the manner described above, absences beyond two missed class periods will result in a deduction in the final grade as follows:

- There are 27 class periods scheduled in this semester.
- Two absences are “free” (no reason need be provided).
- If no attempt is made to contact me to address the situation and/or the plan to address the situation is not followed, each absence beyond the two “free” absences results in a 1% reduction to the final course grade.

Late Assignments/Exams

All assignments, activities, and exams listed in the course schedule that follows are expected to be turned in by the beginning of class on the due date.

Assignments, activities, and exams will only be able to receive half of the possible points if turned in within 24 hours after the due date/time.

Assignments, activities, and exams turned in more than 24 hours after the original due date/time may still receive feedback but will receive 0 points (a grade of 0).

Graded Assignments (71% of total grade, points vary)

There are 18 graded assignments consisting of either quizzes or homework. These assignments are shown under the “Homework” column in the course schedule (below).

These graded done-at-home quizzes and homeworks are graded based on accuracy and thoroughness of completion. Percentage correct is the basis for these grades, with additional adjustments reflecting completion and thoroughness.

Each graded assignment is worth either 3 points (10 assignments), 5 points (7 assignments), or 6 points (one assignment) based on the length of the assignment. The points allocated to each assignment is listed in the course schedule below. Scores on each homework range from 0 (all answers incorrect or incomplete by the due date) to the maximum number of points listed below (all answers complete and correct by the due date).

To receive full points, assignments must be turned in by the beginning of class on the date it is due.

As many of these assignments require use of the SPSS statistical package on a computer, you will need to either use classroom computers or use a laptop with SPSS access (e.g., your own SPSS program copy or a wireless Internet connection to get to SPSS from Virtual Lab, <https://virtuallab.unc.edu/>).

Completion-Only Activities (9% of total grade, 1 point each)

There are 9 activities based solely on completion. These activities are listed under the “Activities” column of the course schedule.

Two of these 9 activities are short surveys and one is a short quiz. These three items are awarded points based on completion. The remaining 6 activities are online forum posts designed to encourage reflection and practice with the concepts taught in the course. These activities ask you to post to the respective forum or discussion with a short response to a particular task (e.g., explaining statistical significance to a fifth grader).

Completion of the survey, quiz, or post as described in the assignment in Sakai will be given a score of “1” for complete and turned in by the beginning of class on the date it is due and a score of “0” for incomplete or not turned in by the beginning of class on the date it is due.

Completion of each of the 9 activities described above will earn the student 1 point each for a total of 9 possible points (or 9%) of the final course grade.

Take-Home Final Exam (20% of total grade, 20 points)

There is one comprehensive take-home final exam worth a total possible 20 points (20%) of the final course grade.

This exam and its supporting data set will be made available through the course Sakai site before the semester is over and will be due by 12:00pm on the date listed in the course schedule that follows.

The exam is a combination of data analysis, interpretation, and presentation of findings. Course module material, homeworks, and print and online sources may be used as reference.

You are strongly encouraged to ask the instructor for help or clarification for any questions you might have on the final take-home exam.

Final Course Grade

Final course grades in graduate-level courses are intended to offer feedback on your performance. Final course grades in this course are based on the qualitative descriptions below and are informed by the points accumulated from assignments, engagement activities, and the final exam.

Percentages indicated below are used as a general guide as follows:

F (fail) = Fail, similar to a 59% or below (an "F")

L (low pass) = Inadequate graduate work, similar to a 60-69% (a "D" grade)

P (pass) = Entirely satisfactory graduate work, similar to a 70-96% (an "A," "B" or "C")

H (high pass) = Inspiring as well as clear excellence, similar to a 97-100% (an "A+" grade)

Syllabus Changes

The professor reserves the right to make changes to the syllabus, including project due dates and test dates. These changes will be announced as early as possible.

Suggested Texts (there are no required textbooks):

Efforts are made to provide students with videos, slides, transcripts, supplemental texts, and examples for understanding the course material.

Students are also encouraged to share materials they find useful throughout the course using forums or discussion spaces offered in the course.

In the spirit of sharing potentially helpful materials that may supplement the course modules, the following citations are offered for consideration:

Available online:

Stockburger, D. Introductory Statistics: Concepts, Models, and Applications. (comprehensive, contains SPSS examples, available free at <http://www.psychstat.missouristate.edu/introbook/sbk00.htm>)

StatSoft Electronic Textbook (a bit advanced, available free at <http://www.statsoft.com/textbook/>)

HyperStat Online (simpler, goes through ANOVA and Chi-Square, available free at <http://davidmlane.com/hyperstat/>)

Sign up for free at Code School to learn free statistics program R at <http://www.codeschool.com/courses>

Textbooks (some are available as online texts for purchase):

Hayes, A. F. (2005). Statistical methods for communication science. Mahwah, NJ: Erlbaum. (goes more into depth with mathematics)

Weber, R., & Fuller, R. (2013). Statistical Methods for Communication Researchers and Professionals. First Edition. Dubuque, IA: Kendall Hunt.

Kranzler, J.H. (2007). Statistics for the terrified, 4th edition. Upper Saddle River, NJ: Pearson Education, Inc. (great introductory primer in paperback, with SPSS examples)

Honor Code

I expect that each student will conduct himself or herself within the guidelines of the University honor system (<http://honor.unc.edu>). All academic work should be done with the high levels of honesty and integrity that this University demands. You are expected to produce your own work in this class. If you have any questions about your responsibility or your instructor's responsibility as a faculty member under the Honor Code, please see the course instructor or the senior associate dean of this school, or you may speak with a representative of the Student Attorney Office or the Office of the Dean of Students.

Accommodations

The University of North Carolina at Chapel Hill facilitates the implementation of reasonable accommodations, including resources and services, for students with disabilities, chronic medical conditions, a temporary disability or pregnancy complications resulting in barriers to fully accessing University courses, programs and activities.

Accommodations are determined through the Office of Accessibility Resources and Service (ARS) for individuals with documented qualifying disabilities in accordance with applicable state and federal laws. See the ARS Website for contact information: <https://ars.unc.edu> or email ars@unc.edu.

Counseling and Psychological Services

CAPS is strongly committed to addressing the mental health needs of a diverse student body through timely access to consultation and connection to clinically appropriate services, whether for short or long-term needs. Go to their website: <https://caps.unc.edu/> or visit their facilities on the third floor of the Campus Health Services building for a walk-in evaluation to learn more.

Expectations for Course Conduct

I strive to make this classroom an inclusive space for all students. Please let me know if there is anything I can do to improve; I appreciate any suggestions. More broadly, our school has adopted diversity and inclusion [mission and vision statements](#) with accompanying goals. These

complement the University policy on [prohibiting harrassment and discrimination](#). In summary, UNC is committed to providing an inclusive and welcoming environment for all members of our community and does not discriminate in offering access to its educational programs and activities on the basis of age, gender, race, color, national origin, religion, creed, disability, veteran's status, sexual orientation, gender identity, or gender expression. The Dean of Students (Suite 1106, Student Academic Services Building, CB# 5100, 450 Ridge Road, Chapel Hill, NC 27599-5100 or [919] 966-4042) has been designated to handle inquiries regarding the University's nondiscrimination policies.

In this course, you are encouraged to represent diverse populations, diverse viewpoints, and diversity of perspective in your own work. You are also asked to be sensitive to the various backgrounds, perspectives, origins, and situations represented by the students in the course, the students, faculty, and staff at this university, and the residents of this state. Together, I hope we can create a welcoming and safe environment that shows respect for each other, value of each other's perspectives and strengths, and integrity in all we do.

Seeking Help

I am committed to helping you overcome challenges that might adversely affect your class performance or final grade. Please meet with me as soon as possible to develop a plan for improving your performance if needed.

Mask Use (COVID-19 and other health concerns)

Enrolled students are not required to wear a mask covering your mouth and nose at all times in our classroom. However, some students and the instructor may elect to wear a mask to protect themselves and/or others in our educational community. Please respect each others' choice of whether to wear or not wear a mask in our classroom. Please also consider washing hands and/or sanitizing as a part of good health hygiene and consider social distancing when possible.

Online Conduct

In efforts to encourage an engaging, safe, and inclusive online environment for this course, please observe the following guidelines for participating in our discussion spaces and other online areas:

1. Using ALL CAPS suggests yelling and possibly anger. Please use *asterisks* around words that you wish to emphasize or *bold.*
2. Sarcasm is difficult to detect with the written word. Please avoid using sarcasm in your online course engagement.
3. Please deliver feedback in a polite and professional manner. Critiques should be directed toward the work and not the person.
4. Class discussion spaces are intended for enhancing learning of the material. Please do not use these spaces for personal messaging.
5. Please be respectful of our privacy and intellectual property and refrain from sharing course materials and messages publicly.
6. Finally, please be mindful of what you intend to communicate before you post any messages and review what you have typed for grammar and professionalism before posting.

University Policy on Non-Discrimination

The University is committed to providing an inclusive and welcoming environment for all members of our community and to ensuring that educational and employment decisions are based on individuals' abilities and qualifications. Consistent with this principle and applicable laws, the University's [Policy Statement on Non-Discrimination](#) offers access to its educational programs and activities as well as employment terms and conditions without respect to race, color, gender, national origin, age, religion, creed, genetic information, disability, veteran's status, sexual orientation, gender identity or gender expression. Such a policy ensures that only relevant factors are considered and that equitable and consistent standards of conduct and performance are applied.

If you are experiencing harassment or discrimination, you can seek assistance and file a report through the Report and Response Coordinators (see contact info at safe.unc.edu) or the [Equal Opportunity and Compliance Office](#), or online to the EOC at <https://eoc.unc.edu/report-an-incident/>.

Title IX

Any student who is impacted by discrimination, harassment, interpersonal (relationship) violence, sexual violence, sexual exploitation, or stalking is encouraged to seek resources on campus or in the community. Reports can be made online to the EOC at <https://eoc.unc.edu/report-an-incident/>. Please contact the University's Title IX Coordinator (Elizabeth Hall,

interim – titleixcoordinator@unc.edu), Report and Response Coordinators in the Equal Opportunity and Compliance Office (reportandresponse@unc.edu), Counseling and Psychological Services (confidential), or the Gender Violence Services Coordinators (gvsc@unc.edu; confidential) to discuss your specific needs. Additional resources are available at safe.unc.edu.

Weekly Schedule

Dates provided in the leftmost column are dates by which all activities in that row (e.g., homework shown in right columns) should be completed.

Activities that below with the respective lesson module are given the same background color to help identify which engagement and homework activities go with each lesson module.

Supplemental lessons (in grey) are optional.

For homework written on paper, you may take photos of the pages, save the photos as a .pdf files, and turn in the .pdf files. Or you may embed photos of the pages into a Word document and turn in the Word document.

DATE	LESSON MODULE	TOPICS COVERED	ACTIVITIES	HOMEWORK
Week of 15 Aug	Getting Started	Course introduction, Expectations with SPSS	This module is a self-paced module that should be visited within the first week of class, either before or after the first day. Please do the following three tasks:	
16 Aug	Understanding Variables	Measuring variables (Statistics are based on assumptions of data, type of variable)	1. View SPSS Introduction powerpoint if needed. 2. Download practice data sets and practice accessing SPSS through UNC's Virtual Lab (virtuallab.unc.edu) or purchase SPSS	3. Take the introductory feeling thermometer by end of day 16 Aug (1 point)
18 Aug	Descriptive Statistics	Mode, Median, Mean, Range, Variance, Standard Deviation	<u>Due today</u> Post – brainstorming on different variables for measuring exposure (1 point)	
23 Aug	Visualizing Descriptive Statistics	Histograms, box plots, Normal distribution		<u>Due today</u> Graded homework: Calculating

				descriptives by hand and in SPSS (5 points)
25 Aug	Foundations of Parametric Statistics	Statistics grouped by parametric and non-parametric tests, Statistics and probability, Central Limit Theorem	(none)	(none)
30 Aug	Probability and z-scores	Primer in how probability is used to create standardized scores, calculation of z-scores	(no points) Take a look at where we are in Statistical Test Selection flow chart	<u>Due today</u> Graded homework: Using the Central Limit Theorem to interpret different samples and their fit with a population (3 points)
1 Sept	Statistical Significance	p-values, statistical significance, and the idea of critical values and degrees of freedom, difference from definition of effect sizes	(none)	(none)
6 Sept	Wellness Day - no class			
8 Sept	Pearson Chi-Square (Nonparametric) Test	Pearson chi-square test by hand and in SPSS, questions addressed	<u>Due today</u> Post – In plain language with review by your fellow students, explain what statistical significance is to a fifth grader (1 point)	<u>Due today</u> Graded homework: Multiple choice and graphing p-values on a normal curve (3 points)
13 Sept	Introduction to Parametric t-tests	t-tests, t-values, assumptions of normality,	<u>Due today</u> Post – Generate hypotheses that could be	<u>Due today</u> Graded homework: Calculating and

		questions addressed	addressed by this analysis (1 point) (no points) Take a look at where we are in Statistical Test Selection flow chart	intepreting the test by hand and in SPSS, completing a write-up from a results template (5 points)
15 Sept	Calculating Independent Samples t-tests	Independent samples t-tests by hand	<u>Due today</u> Post – Generate hypotheses that could be addressed by this analysis (1 point)	(none)
20 Sept	Independent Samples t-tests in SPSS	Independent samples t-tests in SPSS, pooled standard deviation, Levene's test, adjusted t-values	(no points) Take a look at where we are in Statistical Test Selection flow chart	<u>Due today</u> Graded homework: Calculating and intepreting the test by hand, completing a write-up from a results template (3 points)
Recommend after 20 Sept	SUPPLEMENT 1	Paired samples t-tests, one-sample t-test, Mann-Whitney U		
22 Sept	Introduction to ANOVAs	ANOVAs and F-values, assumptions, questions addressed	(none)	<u>Due today</u> Graded homework: Calculating and intepreting the test in SPSS, completing a write-up from a results template (3 points)
27 Sept	Calculating One-Way ANOVAs	One-way ANOVA by hand	<u>Due today</u> Post – Generate hypotheses that could be addressed by this analysis (1 point)	(none)

29 Sept	One-Way ANOVAs in SPSS	One-way ANOVA in SPSS	(none)	<u>Due today</u> Graded homework: Calculating and interpreting the test by hand (3 points)
4 Oct	Post-Hoc Pairwise Comparisons	Post-hoc pairwise comparisons in SPSS	(none)	<u>Due today</u> Graded homework: Calculating and interpreting the test in SPSS (5 points)
6 Oct	2x2 ANOVAs in SPSS	2X2 ANOVA in SPSS	(none)	<u>Due today</u> Graded homework: Calculating and interpreting the test in SPSS, completing a write-up from a results template (3 points)
11 Oct	Post-Hoc Tests for 2x2 ANOVAs	Simple effects post-hoc tests in a 2X2 ANOVA	(none)	<u>Due today</u> Graded homework: Calculating and interpreting the test in SPSS (5 points)
13 Oct	3x2 ANOVAs in SPSS	3X2 ANOVA in SPSS	(none)	<u>Due today</u> Graded homework: Calculating and interpreting the test in SPSS, completing a write-up from a results template (5 points)
18 Oct	No class today (instructor-prompted)			
20 Oct	Fall Break – no class today			

25 Oct	Post-Hoc Tests for 3X2 ANOVAs	Simple effect post-hoc test and post-hoc pairwise comparison in 3X2 ANOVA	(no points) Take a look at where we are in Statistical Test Selection flow chart	<u>Due today</u> Graded homework: Calculating and interpreting the test in SPSS (5 points)
27 Oct	Introduction to Effect Sizes	Effect sizes, Cohen's D, η^2 and Partial η^2	(none)	<u>Due today</u> Graded homework: Calculating and interpreting the test in SPSS, completing a write-up from a results template (5 points)
1 Nov	Introduction to Correlational Tests	Relational tests, scatterplots, assumptions, questions addressed	<u>Due today</u> Post – In plain language to your fellow students, explain the difference between statistical significance and an effect size (1 point)	<u>Due today</u> Graded homework: calculate and interpret a 2x2 and a 3x2 ANOVA with post-hoc comparison in SPSS and calculate η^2 by hand, complete write-up from results template (6 points)
3 Nov	Calculating Covariance	Covariance by hand	(none)	(none)
8 Nov	Calculating Pearson Correlations	Pearson correlation by hand and in SPSS	(none)	<u>Due today</u> Graded homework: Calculating the test by hand (3 points)
10 Nov	R^2	Effect sizes, R^2	(none)	<u>Due today</u> Graded homework: Calculating and interpreting the

				test by hand and in SPSS, completing a write-up from a results template (3 points)
Recommend after 10 Nov	SUPPLEMENT 2	Spearman's Rho		
15 Nov	Internal Consistency	Reliability (vs validity), Average inter-item correlation, Cronbach's alpha	(none)	<u>Due today</u> Multiple choice graded quiz: Understanding r and r^2 (3 points)
17 Nov	Introduction to Linear Regression	Linear Regressions, F-values, R^2 values, assumptions, questions addressed	(none)	<u>Due today</u> Graded homework: Completing a measures section with descriptives, Cronbach's alpha, and correlations between measures from template (3 points)
22 Nov	Simple Linear Regression in SPSS	Conducting and interpreting Simple Linear Regression in SPSS	(none)	(none)
25 Nov	Thanksgiving Break – no class today			
29 Nov	Multiple Linear Regression in SPSS	Conducting and interpreting Multiple Linear Regression in SPSS	(none)	Multiple choice quiz: Identifying the appropriate test (1 point)
By 6 Dec			Take the exit feeling thermometer (1 point)	
6 Dec	Turn in final exam by 12:00pm noon (20 points)			