Advanced Statistics and Research Design

18:820:585:01, Spring 2026

Time/Place

Tuesdays, 2:00pm to 4:45pm
Room: A317
Canvas Site: https://rutgers.instructure.com/courses/395796

Instructor

Adam Lekwa, PhD, NCSP
Email: al928@gsapp.rutgers.edu;
Office Location: GSAPP, room A353
Office Hours: Tuesdays, 12:00pm to 1:00pm

Course Goal & Objectives

The primary goal of this course is to help students build upon basic knowledge of quantitative analysis using correlational and regression methods. Students will also gain proficiency in critical consumption and evaluation of quantitative research through exposure to foundational concepts in scientific methodology, study designs, and psychological measurement. This course will include lectures and lab sessions.

Primary Learning Objectives

1. To learn about how **psychological measures** are constructed and tested in research.
2. To know a range of **research methods** to draw and generalize valid causal inferences.
3. To understand and implement **techniques of data analysis** to evaluate and report intervention efficacy and effectiveness. The techniques of data analysis will include: indices of association, general and generalized linear modeling, and advanced extensions of linear regression techniques.

Readings

Students will be expected to have read each text prior to the session for each week. Because time during class sessions is limited, assigned and suggested readings for this course are to help students gain additional background knowledge related to topics presented through lecture, discussion, or student presentation. Class sessions will make reference to, but will not necessarily repeat, information presented in readings.

Readings assigned for each week will be from the primary textbook (listed below) or posted as PDF files under the "Resources" section of our Sakai website. See the course calendar for a detailed list of assigned readings. Please keep in mind that lecture topics and assigned readings might change throughout the semester based on students' needs and class progress.

Primary Text

Keith, T. Z. (2015). Multiple Regression and Beyond. 2nd Ed. New York: Routledge/Taylor & Francis Group.

Attendance Policy

Attendance is required. Students are responsible for planning with the instructor (as far in advance as possible) to make up absences.

Determination of Course Grades

Grades in this course will be assigned based on assignment completion and test performance. Final course grades will be rounded to the nearest whole number (e.g., 89.5 would be rounded to 90, or 89.4 would be an 89). Grading will follow Rutgers' criteria:

100-90 A; 89-85 B+; 84-80 B; 79-75 C+; 74-70 C; 69-60 D; 59-0 F

Course Evaluation

Rutgers University issues a survey that evaluates both the course and instructor. Students will complete this survey toward the end of the semester, and students' identities cannot be connected to their responses. The aggregated numerical results are public, and the numerical results and comments are shared with the instructor, and GSAPP. This survey will also be used by GSAPP to conduct a mid-point evaluation, the results of which are confidential to the instructor and school.

Disability Accommodation

Rutgers University welcomes students with disabilities into all of the University's educational programs. In order to receive consideration for reasonable accommodations, a student with a disability must contact the appropriate disability services office at the campus where you are officially enrolled, participate in an intake interview, and provide documentation: https://ods.rutgers.edu/students/documentation-guidelines. If the documentation supports your request for reasonable accommodations, your campus's disability services office will provide you with a Letter of Accommodations. Please share this letter with your instructors and discuss the accommodations with them as early in your courses as possible. To begin this process, please complete the Registration form (https://webapps.rutgers.edu/student-ods/forms/registration).

Statement on Academic Integrity

The University's academic integrity policy, to which this class will adhere, can be reviewed at: http://academicintegrity.rutgers.edu/academic-integrity-at-rutgers/.

Names and Pronouns

Class rosters are provided to the instructor, but please let me know if you prefer to use a specific name or pronoun, and I am happy to do so. You can learn more about the university Chosen Name Initiative here: https://diversity.rutgers.edu/chosen-name

Respect for Diversity

It is my intent that students from all diverse backgrounds and perspectives be well-served by this course, that students' learning needs be addressed both in and out of class, that the diversity that the students bring to this class be viewed as a resource, strength and benefit, and that all diversity of our clients and research reviewed be discussed and addressed with thoughtfulness and compassion. It is my intent to present materials and activities that are respectful of diversity: gender identity, sexuality, disability, age, socioeconomic status, ethnicity, race, nationality, religion, and culture. I have implicit biases and blind spots, and while it should not be your job to correct these, your feedback and suggestions about how to make this class more compassionate and accessible are encouraged and appreciated. SIRS feedback will also be collected and incorporated at midway and the end of the semester.

This is a living syllabus document subject to change throughout the semester based on pertinent public health topics and student feedback.

Tentative Class Schedule, Readings, and Assignment Due Dates

Week	Topic	Readings	Due
1: 1/20/26	Data work, missing data, & review of correlation and simple linear regression.	APA JARS (2018) Keith, Appendix B	
2: 1/27/26	Multiple Regression	Keith Ch. 1 & 2	Exercise 1
3: 2/3/26	Multiple Regression, cont.: evaluating IVs, model diagnostics, power	Keith Ch. 3 & 4	Exercise 2
4: 2/10/26	Modelling with categorical predictors, & model selection strategies	Keith Ch. 5 & 6	Exercise 3
5: 2/17/26	Using multiple regression to study moderation	Keith Ch. 7	
6: 2/24/26	Logistic regression to study binary outcomes (online)	Keith Ch. 10	Exercise 4
7: 3/3/26	Review session		CITI Training
9: 3/10/26	• *Exam. 1: In person, A317, from 2:00pm to 4:45pm*		Exam 1
8: 3/17/26	*No Class: Rutgers Spring Break*		
10: 3/24/26	Re-introduction to psychological measurement.		
11: 3/31/26	Procedures to evaluate psychometric properties of test scores • Internal consistency & reliability • Analysis of factor structure		Exercise 5 Article Critique #1

12: 4/7/26	Science and the scientific method, and four types of validity. Critical consumption of quantitative psychological research.	Judd & Kenny (1981); Kaplan (1987); Drost (2011);	
13: 4/14/26	Treatment outcome research • RCTs and other forms of group designs	Spokas (2008)	
14: 4/21/26	Treatment outcome research, cont. • Effect Sizes • Quasi-experimental designs • Single Case Designs (SCD)	Cook (2008)	Group Research Project
15: 4/28/26	*Exam 2*		Exam 2; Article Critique #2

Assignments and Examinations

Overview of Assignments & Exams

1. **CITI training modules** on ethics in human subjects research (required, but not graded).
2. **Exercises** in Statistical Analysis (n = 5); 30% of final course grade.
3. **Exam. #1:** Correlation and Regression; 26% of final course grade.
4. **Group Research Project**; 6% of final course grade.
5. **Article Critiques** (n = 2); 12% of final course grade.
6. **Exam. #2:** Correlation, Regression, Measurement, & Research Design; 26% of final grade.

CITI Training

Each student must send the instructor proof that s/he successfully completed the CITI training modules before the end of this semester. Although no points are associated with this assignment, any student who does not submit proof of completing this training will receive an "Incomplete" for the final grade in the course.

If you have already completed this training, and your certification is still valid (it is good for three years), just send me the PDF you received from CITI once you completed this training and you will have satisfied this course requirement.

If you have not completed this training you should visit https://orra.rutgers.edu/citi. This training can be completed in a few hours, and you do not have to do it in a single session. When you are finished CITI will send you a PDF, which you should send to me to satisfy this course requirement.

Exercises in Statistical Analysis (n = 5): Due approximately weekly.

A total of five exercises will be assigned in the first half of the course in which students will practice independently the methods taught during class and in lab sessions. Note that grades for these exercises are only given for completion, not for accuracy. The purpose for these assignments is to ensure that students practice concepts and skills from class independently and can receive feedback based on their performance. As such, these are regarded as formative assessments for grading purposes and accuracy will not be scored—just completion. An exercise will be scored as "complete" if adequate efforts have been made to answer all items thoroughly; exercises turned in without thorough responses to each item will be scored as "incomplete" (0 points).

Exercises are posted in the "Assignments" folder under "Resources" on the Canvas page for this course. These assignments may be submitted electronically to me by email or submitted in hard copy as well.

Examination #1: Correlation and Regression

This test will cover all material covered in the first half of the course and may require knowledge of concepts and skills from your Fall statistics course. This exam will be open-book and open-notes and will be completed in person during our regular class time in GSAPP room A317**.**

Group Research Project: Due 4/7/2026

Students will divide into groups (approximately four groups) to analyze a dataset provided by the instructor. A detailed description of this project is provided on the Canvas page for this class in the "Assignments" folder under "Resources". In addition to providing you with more practice in quantitative analysis, this assignment will begin to help you integrate thinking about analytic assumptions, procedures, and interpretations with thinking about scientific rationale and research design (major themes for the second half of this course). Each group will:

- fully screen, clean, and analyze the provided data set, then interpret the results;
- develop a presentation (use Powerpoint or Google Docs);
- present your findings in class (can present as a group or select one presenter from the team).

Article Critiques (n = 2): Due 3/24/2026 and 4/28/2026

Students will complete two separate critiques of quantitative research to put into practice the concepts and skills introduced during lectures in the second half of the course (after we complete exam. #1). In each critique, students must critically evaluate (1) the rationale for the conduct of the study (2) the research and analytic methods used (3) interpretations of results, and (4) implications for practice and research in psychology.

You will identify two quantitative studies; at least one of which much present the results of a treatment study. Both studies must be approved by me before you begin writing your critiques. The written critiques should be between 2 and 5 pages long (double spaced), although I am much more concerned with coherence critical thinking, and completeness than overall page length or word count. A rubric with more detailed instructions for these critiques has been placed in the "Assignments" folder under "Resources" in the Canvas site for this course.

Critiques may be emailed to me or given to me in hard copy. I will make efforts to return feedback to you on these critiques one to two weeks after they are submitted.

Examination #2: Measurement, Design, & Analysis

This exam, as with exam #1, will be open-book and open note, and will be in person in GSAPP room A317 at our regularly scheduled class time. Students will be provided with 2.75 hours to complete this exam (unless otherwise specified).