

Fall 2021

Quantitative Research Methods in Education I (3 credits)

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Instructor: Lynne E. Kowski, Ph.D.	Email: Email: via Canvas “Inbox” email tool OR Lynne.Kowski@gse.rutgers.edu
Phone Number: N/A	Location: Rutgers Academic Bldg. AB 1230 Day: Wednesday Time: 5 – 8 pm
Office hours: <i>remote via Zoom by appointment only</i>	Prerequisites or other limitations: None. No prior knowledge of statistics is required, but <i>essentials of arithmetic and basic algebra will be used throughout the semester.</i>
Mode of Instruction: Lecture	Permissions required: none for matriculated students

Course Catalog Description: Introduction to quantitative techniques, examining their potential and limitations for investigating educational questions and issues. Topics include one- and two-sample tests of hypotheses, analysis of variance, multiple comparison procedures, regression, and effect size.

Learning Goals

- **Program goals:** The Master’s of Education degree in Educational Statistics, Measurement and Evaluation aims to provide students training in basic and intermediate statistical, measurement, and evaluation methods. It serves as a preparation for students interested in working in research institutions, and pursuing Ph.D. studies in educational statistics and measurement or a related educational field. The Ph.D.in Statistics and Measurement within the Learning, Cognition, Instruction, and Development concentration prepares students to become statisticians and psychometricians with broad expertise in applied statistics, measurement theory, educational assessment and statistical analysis. An important feature of the program is early exposure to research and active learning through a variety of course offerings.
- **Course goals:** Topics covered in this course include graphical representations, descriptive statistics, correlation, regression, experimental designs, basic probability, sampling distributions, confidence intervals, and hypothesis testing.

Upon successful completion of this course, you will be able to complete the following tasks:

1. Understand the probability theory, the foundation of statistical methods.
2. Understand the distributions of random variables as well as their properties.
3. Have a basic understanding of correlation and linear regression.
4. Carry out the statistical analysis using calculator and/or computer software (SPSS).
5. Test research hypotheses by applying probability theory.
6. Explain the differences among various statistical techniques and identify an appropriate technique for a given set of variables and research questions.
7. Make a decision based on the statistical test results and interpret the results.

Class Materials/ Textbooks

- Optional Textbook: Moore, D. S., McCabe, G.P. & Craig, B.A. (2017). Introduction to the Practice of Statistics (9th ed) edition). New York: W. H. Freeman
- Calculator: Any scientific statistical calculator (non-graphing or graphing) is necessary for homework assignments, class exercises and exams.
- Software: SPSS for Windows (Version 21 or newer), may be necessary for some homework assignments. On campus, the latest version of SPSS is available for students at all the university computing labs, Alexander Library, and at the GSE computer lab. Off campus, SPSS is available through the Rutgers Remote Apps Server. <https://labgateway.rutgers.edu/#/> After logging in, if you click on one of the 'OIT Computer Labs' options, it will remotely log you into a New Brunswick PC.

Grading Policy: Final letter grade will be assigned as follows:

Final Score	Letter Grade
90% and above	A
80%-89.9%	B+
75%-79.9%	B
65%-74.9%	C+
60%-64.9%	C
55%-59.9%	D
below 55%	F

Course Website

- Canvas: <https://canvas.rutgers.edu/>
Canvas is your online class room resource. You will be able to access all course materials, including homework and test reviews here. You will also see the due dates of each assignment and the test dates for the entire semester. Lastly, you will have access to your grade book. For FAQs follow this link: <https://canvas.rutgers.edu/documentation/students/>
- Efficient communication is the key for learning and understanding. **Emailing via Canvas (preferred)** or directly (Lynne.Kowski@gse.rutgers.edu) are the two communication tools that we heavily rely on. To maximize teaching and learning, be sure to check your email account (before the start of the semester) and your Canvas course email (once the course begins) frequently and make sure you are able to read information, download files, send/receive messages, and access your grades from the Canvas website. All information and activities are time sensitive.

Course Assessments

- **Exams:** The two exams, midterm and final, are worth 30% and 30% of the final grade, respectively. The exams may consist of multiple choice items, true/false items, computations, and short answer questions. Exams are held during class time. The exams will be created to measure the course goals listed above. ***No makeup exam will be granted unless 1) there is advance notice or 2) emailing me with the request within 24 hours of the exam, along with written documentation to be handed in the next class or the day of the makeup exam.*** The format of the make-up test is at the discretion of the instructor.
- **Homework assignments:** Approximately 10 homework assignments, worth 40% of the final grade, will be given throughout the semester. Homework assignments will be created to assess the course goals. Some problems require SPSS analyses. Homework assignments are due at the beginning of the class the week after they are assigned. You have a whole week to work on a homework assignment. ***For every portion of a week a homework assignment is late, there will be a 10% point reduction.***
- **Attendance/Participation:** Your attendance and participation are expected throughout the semester. Please bring any necessary planned absences to my attention ahead of time. Content questions during class, via email, or at office hours are strongly encouraged. ***During class, cell phones and similar devices must be silenced and stowed at all times.***

Teaching Methodology: ***All course materials, assignments, due dates, etc. are found in the Canvas course.***

Log into RV Commons, scroll down and click on Canvas. ***Be sure to bookmark this page for easy direct access.*** Even if we go to a **REMOTE** synchronous class, it will be treated like an on-campus class, i.e. it is your responsibility to attend all classes (if remote – attend in Zoom with your camera on). Attendance will be taken each class meeting and while it may not count towards your final grades, it does affect your success in the class. You are responsible for reading all materials on time according to the Canvas calendar **BEFORE** attending class.

Expectations: ***For every credit hour, you should expect to spend approximately 2 hours outside the classroom reading, doing homework, studying per week. Therefore, for this 3-credit class you should expect to devote about 6 hours per week.***

Academic Integrity Policy: Any violation of academic honesty is a serious offense and is there subject to an appropriate penalty. The Office of Student Conduct supervises issues related to violations of academic integrity (see <http://academicintegrity.rutgers.edu>). Please familiarize yourself with the university policy on academic integrity at <http://academicintegrity.rutgers.edu/academic-integrity-policy> for a full explanation of policies.

Attendance and Withdrawal Policy: All students are expected to every class. Regular attendance and participation is essential for success in the course. ***In all cases, the responsibility for withdrawing from the course belongs to the individual student.*** Failure to withdraw may result in an "F" grade for the course. Those who simply stop attending and participating in the class may receive an "F" grade for the course. Please contact me in advance (if possible) to explain your lack of attendance and to obtain any viable extensions on assignments.

Students with Documented Learning Differences:

Reasonable 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 disabilities 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' disabilities 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 by following the link for the ODS website: <https://webapps.rutgers.edu/student-ods/Forms/LOA>.

Learning Resource Centers:

The learning Resource Centers offer a variety of tools/strategies to help students with their studies including academic coaching, tutoring and writing assistance. Students can contact the Learning Resource Center on their campus for an appointment. More information may be found at: <https://rlc.rutgers.edu>.

Tentative list of topics

For complete details regarding due dates and requirements, refer to the Canvas course modules

No prior knowledge of statistics is required, but essentials of arithmetic and basic algebra will be used throughout the semester.

- ❖ The following class schedule is subject to change if necessary. Reading assignments should be completed prior to each lecture.
- ❖ **SPSS** analysis will be explored at the end of the lectures for which it applies.
- ❖ **Religious Holy Days** sometimes conflict with class and examination schedules. You must notify your instructor of any conflict *prior* to the class(es) scheduled on dates you will be absent to observe a religious holy day.

Week/Class Date	Assigned Reading Sections & Homework
Week 1: September 1 st – 7 th	1.1 Data Distributions 1.2 Displaying and Describing Distributions 1.3 Describing Distributions with Numbers
<i>NO CLASS Wednesday September 8th ~ Rutgers Monday Schedule!</i>	
Week 2: September 15 th – 21 st <i>Remote ZOOM lecture 4-6 pm (This will be recorded & uploaded into Canvas)</i>	1.4 Density Curves and Normal Distributions 2.1 Relationships 2.2 Scatterplots 2.3 Correlation

Week 3: Sept. 22 nd – 28 th	2.4 Least-Squares Regression 2.5 Cautions about Correlation and Regression 3.2 Designs of Experiment 3.4 Introduction to Statistical Inference
Week 4: Sept. 29 th – Oct. 5 th	4.1 Randomness 4.2 Probability Models 4.3 Random Variables 4.4 Means and Variances of Random Variables
Week 5: October 6 th – 12 th	5.2 Sampling Distribution Counts & Proportions 5.1 Sampling Distribution of a Sample Mean 6.1 Estimating with Confidence
Week 6: October 13 th – 19 th	6.2 Tests of Significance 6.3 Use and Abuse of Tests; Effect Size 6.4 Power and Inference as a Decision
Week 7: Oct. 27 th – Nov. 2 nd	Midterm Review
Week 8: November 3rd	MIDTERM EXAM Sections 1.1 – 6.4
Week 9: November 3 rd – 9 th	7.1 Inference for the Mean of a Population 7.2 Comparing Two Means 8.1 Inference for a Single Proportion
Week 10: November 10 th – 16 th	8.2 Comparing Two Proportions 12.1 Inference for One-Way ANOVA 12.2 Comparing the Means
Week 11: November 17 th – 23 rd	13.1 The Two-Way ANOVA Model 13.2 Inference for Two-Way ANOVA 10.1 Simple Linear Regression
<i>Wednesday November 24th No Class!</i>	
<i>Thanksgiving Recess Thursday November 25th – Sunday November 28th</i>	
<i>Monday November 29th is a Rutgers Wednesday Schedule!</i>	
Week 12 & 13: November 29 th – December 7 th	Monday, November 29 th : 10.2 More Detail about Simple Linear Regression 11.1 Inference for Multiple Regression 11.2 A Case Study Wednesday, December 1 st : 9.1 Inference for Two-Way Tables 9.2 Goodness of Fit
Week 14: December 8 th – 14 th	Final Exam Review
<i>Reading Days: Tuesday December 14th and Wednesday December 15th (no classes)</i>	
Week 15: December 22nd	FINAL EXAM Sections 7.1 – 13.2