



## **Quantitative Methods – Summer 2021**

**830:200: H6, 4 Credits**

### **Course Information**

**Dates & Time:** 06/01 – 07/09 MTWTH 11:00am – 1:35pm (Synchronous Lectures)

**Location:** Zoom – Link will be updated on Canvas\*

### **Instructor**

**Michelle Rosenthal**

**Office:** Busch Psychology Building, room 323,

**E-mail:** michelle.c.rosenthal@rutgers.edu

**Office Hours:** TBD

### **Textbook:**

Required:

Essentials of Statistics for the Behavioral Sciences

5<sup>th</sup> Edition Susan Nolan, Thomas Heinzen,

E-book ISBN: 9781319370947

Paperback ISBN: 9781319247195

The lectures will be based on this book. The text cover all the principles of Classical Statistics from a Behavioral Sciences point of view.

### **Assigned Reading (VERY important!)**

You are expected to complete the assigned reading for the day BEFORE you come to class.

Remember that this is a course with an accelerated pace relative to spring and fall semester courses. That means that you are expected to bare the responsibility for being prepared for that day's lecture through reading beforehand, it will give you the fundamental ideas of what we will be doing that day and during lecture we can focus on the details. I am lecturing with the assumption that everyone has completed the assigned readings for that day; if you don't read, you will very likely be lost!

### **Course Description**

This course is an algebra-based introduction to Statistics. Understanding data is the overall goal of this course. You already know all the math you need to succeed in the course! Nothing more than addition, subtraction, multiplication and division. The course will cover the foundational principles of Classical Statistics (probability, sampling, and regression), the most common hypothesis testing techniques (t-tests, analysis of variance, etc.) and will serve as an

introduction to SPSS statistical software. We will follow the book very closely: it is very important that you keep up with the readings and lectures.

### **Specific Aims & Outcomes**

This course has been certified as satisfying both Quantitative and Formal Reasoning Learning Outcome Goals of the SAS Core Curriculum. Specifically, students will be able to:

1. Formulate, evaluate, and communicate conclusions and inferences from quantitative information.
2. Apply effective and efficient mathematical or other formal processes to reason and to solve problems.

### **Exams**

There will be one midterm and one final exam. The final is non-cumulative. A calculator is allowed and a cheat sheet will be provided with the most common formulas. The exams will have a conceptual part (definitions, principles, etc.) and a computational part. Except for the actual numbers, the structure and the process involved in solving the computational problems will be identical to those used in class. Make-up exams may be scheduled in case of a serious illness or family emergency: again, arrangements must be made BEFORE your exam date.

### **Homework**

Each homework is composed of two parts

- Canvas submission of HW assignment
- Write-up of same HW assignment uploaded into Canvas

Failure to submit the written assignments will result in a zero for the assignment. Late assignments are not accepted, unless in case of a serious illness or family

Emergency. Arrangements must be made BEFORE the homework due date. Late homework cannot be accepted for any reason once the answer key is posted, usually one day after the assignment deadline

### **Grade Calculation Breakdown**

Weekly Homework Problems: 30%

Midterm 30%

Final (non-cumulative): 40%

### **Grading**

Final grades will be assigned using the following scale:

A: 90.0 -100.0%

B+: 85.0-89.99%

B: 80.0-84.99%

C+: 75-79.99%

C: 70-74.99%

D: 60.0 - 69.99%

F: 0.0 - 59.99%

## Academic Integrity:

Each student in this course is expected to abide by the Rutgers University Code of Student Conduct and Academic Integrity Policy. Any work submitted by a student in this course for academic credit will be the student's own work. Penalty for violation of the University Code of Student Conduct can also be extended to include failure of the course and University disciplinary action. The risk really isn't worth it.

During examinations, you must do your own work. You may not compare papers, copy from others, or collaborate in any way. You are expected to show all of your work on all computational problems. Any collaborative behavior during the examinations **will** result in failure of the exam, and may lead to failure of the course and University disciplinary action. In short: do not cheat! Do not plagiarize! Visit <http://academicintegrity.rutgers.edu/resources-for-students> for info and useful links.

## Disability Services

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 they are officially enrolled, participate in an intake interview, and provide documentation. For more information visit the Rutgers Office of Disability Services: <https://ods.rutgers.edu>.

## General Principle:

Please ask questions! It's the only reliable way I have of knowing whether you've understood what I'm trying to convey. Even if you can't articulate what it is you don't understand, just say "I have no idea what you're talking about," or "I'm lost," or "Help!" Chances are that if you don't get it, there are a number of your classmates who are also floundering, but I can't read your minds (I promise). Help everyone out (including me) by asking, please!

## ***\*\*Disclaimer\*\****:

Everything in this syllabus is subject to change at my discretion. You will be informed ahead of time if such changes are made.

**Class Schedule (tentative; subject to change)**

Week	Date	Text Readings	Topics/Events
1	Tues. 6/1	<ul style="list-style-type: none"><li>- Chapter 1</li></ul>	<ul style="list-style-type: none"><li>- Orientation - syllabus review</li><li>- Types of measurement - nominal, ordinal, interval/ratio</li><li>- Independent v. dependent variables</li><li>- Issue in scientific measurement: reliability and validity</li><li>- Intro to hypothesis testing</li><li>- Data ethics</li></ul>
	Wed. 6/2	<ul style="list-style-type: none"><li>- Chapter 2</li><li>- Chapter 3</li></ul>	<ul style="list-style-type: none"><li>- Frequency distributions measures of variability - range, variance, and standard deviation.</li><li>- Kurtosis and skew</li><li>- Characteristics of the normal distribution</li><li>- Visual Displays of Data</li></ul>
	Thurs. 6/3	<ul style="list-style-type: none"><li>- Chapter 4</li></ul>	<ul style="list-style-type: none"><li>- Central tendency &amp; variability</li><li>- Sampling distribution of the mean</li><li>- Central Limit Theorem Measures of central tendency - mean, median, mode, range</li><li>- Standard Deviation</li></ul>
2	Mon. 6/7	<ul style="list-style-type: none"><li>- Chapter 5</li></ul>	<ul style="list-style-type: none"><li>- Sampling &amp; Probability</li><li>- Developing and testing a hypothesis</li><li>- Alpha level and statistical significance</li><li>- Type I &amp; II Errors</li></ul>
	Tues. 6/8	<ul style="list-style-type: none"><li>- Chapter 6</li></ul>	<ul style="list-style-type: none"><li>- The Normal Curve</li><li>- Transforming raw score into Z score</li><li>- Null and alternative hypotheses</li></ul>
	Wed. 6/9	<ul style="list-style-type: none"><li>- Chapter 7</li></ul>	<ul style="list-style-type: none"><li>- The Z-test and confidence intervals</li><li>- Hypothesis Testing with Z tests</li></ul>

	Thurs. 6/10	- Chapter 8	<ul style="list-style-type: none"> <li>- Confidence Intervals</li> <li>- Effect Size</li> <li>- Statistical Power</li> </ul>
3	Mon. 6/14	Chapter 9	<ul style="list-style-type: none"> <li>- Single Sample t-Test</li> <li>- Paired Sample t-Test</li> </ul>
	Tue. 6/15	- Chapter 10	- Independent-Samples t-test
	Wed. 6/16		- Review for Midterm
	Thurs. 6/17		MIDTERM
4	Mon. 6/21	- Chapter 11	<ul style="list-style-type: none"> <li>- One Way Between Groups ANOVA</li> <li>- F Distribution</li> <li>- Post-hoc tests</li> </ul>
	Tues. 6/22	<ul style="list-style-type: none"> <li>- Chapter 11 Continued</li> <li>- Chapter 12</li> </ul>	<ul style="list-style-type: none"> <li>- Two-Way Between-Groups ANOVA</li> <li>- Understanding Interactions</li> <li>- Conducting a Two-Way Between-Groups ANOVA</li> </ul>
	Wed. 6/23		- Stats Workshop
	Thurs. 6/24	- Chapter 12 Continued	Conducting a Two-Way Between-Groups ANOVA
5	Mon. 6/28	- Chapter 13	<ul style="list-style-type: none"> <li>- Correlations</li> <li>- Pearson's R</li> </ul>
	Tues. 6/29	- Chapter 14	- Linear Regression Analysis: Predicting values on a criterion using a predictor and the regression equation.
	Wed. 6/30	Chapter 14 Continued	Linear Regression Continued
	Thurs. 7/1	- Chapter 15	<ul style="list-style-type: none"> <li>- Intro to Nonparametric Statistics &amp;</li> <li>- Chi-Square Tests</li> </ul>

6	Mon. 7/5	- Chapter 16	- Choosing & Reporting Statistics
	Tues. 7/6		- Stats Workshop
	Wed. 7/7		- Review for final exam
	Thurs. 7/8		FINAL EXAM