Statistical Methods I - STAT 210 - Fall 2025

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Office: Trexler 270G

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Office Hours: 11:00-12:00 PM, Tuesday, Thursday, and by appointment. You can email me to set up an appointment at a different time.

Meeting Time: 1:10-2:10 PM, Monday, Wednesday, Friday

Meeting Place: Trexler 263

Required Texts: OpenIntro Statistics Fourth Edition by David Diez, Mine Cetinkaya-Rundel, Christopher D Barr I would recommend buying a physical copy buy you can download the electronic copy for free! You can find the book using the URL: https://www.openintro.org/stat/textbook.php

Course Objective: The objective of this course is to understand how to use statistical methods to describe data and make statistical inferences. We will start by learning how to collect data and design experiments. Next, we will focus on describing data using graphical and numerical methods. Building our descriptive techniques, we will learn probability theory to understand how to make statistical inferences. Throughout the course we will focus on statistical computing and clearly articulating our results.

Intended Learning Outcomes: By the end of this course, students will be able to …
…understand how to design an experiment and collect data.
…critically read and interpret statistical findings in journals and in the news.
…describe the key features of a data set using graphical and numerical methods.
…understand probability and how it relates to statistical inference.
…understand statistical inference and its limitations.
…clearly state a research question and pick an appropriate statistical method.
…use statistical software to organize and analyze data.
…articulate statistical methods and results to an audience of experts and non-experts.
…use R, RStudio, and the tidyverse to analyze statistical inquiries.

Content:

- Producing Data
- Designing Experiments
- Graphical Methods (Histograms, Dot Plots, Pie Charts, Bar Charts, Box Plots, Stem and Leaf Plots, Scatterplots)
- Numerical Methods (Mean, Median, Standard Deviation, 5-Number Summary)
- Correlation and Linear Regression (OLS)
- Probability Models and Random Variables
- Probability Rules
- The Binomial Distribution
- The Central Limit Theorem
- Inferences for 1 and 2 Sample Proportions (z-tests)
- Inferences for 1 and 2 Sample Means (t-tests)
- Chi-Square Test
- ANOVA
- Simulation
- R

- R Markdown
- The Tidyverse

INQ 240: You cannot get credit for this course if you have taken INQ 240, as this course covers the same material. If you are in MCSP and have taken INQ 240, you need to take STAT 220 to fulfill your statistics requirement.

Structure of the course: We will be learning statistical methods covered in the book and how to implement them using the statistical software R. Many days we will be working together in R, so please bring your laptop to class with you every day.

Homework: We will have daily HW on www.myopenmath.com. Each day, there will be homework due for the following class. Register at myopenmath to set up an account. Course ID: 294141. Enrollment key: RCSTAT.

Quizzes: We will have short quizzes occasionally to help prepare for the tests.

Labs: We will have serval labs throughout the semester that will focus learning statistical computing using R.

Tests: Tests will assess students understanding of material covered in class, take home readings, and homework assignments. The tests will be on

Friday, September 19th
Wednesday, October 8th
Wednesday, November 5th
Wednesday, December 3th

Final Exam: The final exam will be cumulative and will be on Wednesday, December 10th at 2PM.

Grading: Grades will be assigned based on written assignments, quizzes, tests, and a final exam as follows,

Tests	55%
Homework/Labs/Quizzes	30%
Final Exam	15%

Grades will be determined based on the following:

A	> 93	B	83 – 86.9	C	73 – 76.9	D	63 – 66.9
A-	90 – 93	B-	80 – 82.9	C-	70 – 72.9	D-	60 – 62.9
B+	87 – 89.9	C+	77 – 79.9	D+	67 – 69.9	F	< 60

Attendance: Class attendance is a very important aspect of a student's success in this course. The student is expected to attend every class and is accountable for missed content and assignments.

Missed Test: If you have to miss a test and have discussed it with me before the class takes the test, we can work together to re-schedule the test up to two days after the scheduled date. If it is not possible to take the test in that time period, I will replace that test grade with your final exam grade.

Make-up Work: No make-up work will be accepted. Any excused work will be replaced by the final exam. If an assignment is not turned in before the deadline and you have not contacted me about the assignment, it is considered unexcused.

Expected Hours of Work: This course expects you to spend at least 12 hours of work each week inside and outside of class.

Technology: Scientific calculators and the statistical programs R and RStudio will be used throughout the semester in the classroom and on assignments.

R Download: https://www.r-project.org/
RStudio Download: https://rstudio.com/products/rstudio/download/

Academic Integrity System: Students are expected to adhere to the Academic Integrity policies of Roanoke College. All work submitted for a grade is to be your own work! No electronic devices other than calculators can be taken out during any class or testing period (this includes cell phones) unless written consent is given by the professor. Note that looking at or using your cell phone during a test or quiz is considered a violation of Academic Integrity regardless of your purpose or intent in doing so. Since a central goal of this subject is to help you become independent and critical thinkers, you are discouraged from the extensive use of generative AI tools to create code or text as part of your work. If you do use AI-generated content in your assignments, you must clearly indicate what work is yours and what part is generated by the AI.

The Writing Center Roanoke College, located on the Lower Level of Fintel Library (Room 5), offers free tutorials focused on writing projects and oral presentations for students working in any field. Writers and presenters at all levels of competence may visit the Writing Center at any point in their process—including brainstorming, drafting, organizing, editing, or polishing presentation skills—to talk with trained peer tutors in informal, one-on-one sessions. The Writing Center is open Sunday through Thursday from 4 to 9 PM. Simply stop in, or schedule an appointment at www.roanoke.edu/writingcenter. Questions? Email writingcenter@roanoke.edu or call 540-375-4949.

Subject Tutoring, located on the lower level of Fintel Library (Room 5), is open 4-9 PM, Sunday-Thursday. Subject Tutors are highly trained, current students who offer free, one-on-one (and small group) tutorials in over 80 courses taught at Roanoke College, including: Business, Economics, Mathematics, INQ 240, Modern Languages, Lab Sciences, and Social Sciences. Check out all available subjects and schedule 30- or 60-minute appointments at www.roanoke.edu/tutoring. If you have a question, feel free to stop by, or contact us at subject_tutoring@roanoke.edu or 540-375-2590. See you soon!

Accessible Education Services (AES) is located on the first floor of the **Bank Building**. AES provides reasonable accommodations to students with documented disabilities. To register for services, students must self-identify to AES, complete the registration process, and provide current documentation of a disability along with recommendations from the qualified specialist. Please contact Dustin Persinger, Assistant Director of Academic Services for Accessible Education, at 540-375-2248 or by e-mail at aes@roanoke.edu to schedule an appointment. If you have registered with AES in the past and would like to receive academic accommodations for this semester, please contact Dustin Persinger at your earliest convenience to schedule an appointment and/or obtain your accommodation letter for the current semester. The testing center, also located on the first floor of the Bank Building, can be reached at 540-375-2247.

Student Health & Counseling Services supports students through in-person health appointments, in-person counseling, 24/7 telehealth (TimelyCare), Therapy Assistance Online, as well as resources related to general wellness, LGBTQ+, sexual assault, substance abuse, and suicide prevention. Unmet health needs can negatively impact your performance in this course. Student Health & Counseling Services can help. Please see https://www.roanoke.edu/shcs for more information and to access services.

Schedule: This could change during this semester, but I will always let you know ahead of time.

Week	Day	Date	Topic
1	W	27-Aug	Introduction
1	F	29-Aug	Chapter 1: Intro to Data
2	M	1-Sep	Chapter 1: Intro to Data
2	W	3-Sep	Chapter 2.1: Numerical Data
2	F	5-Sep	Chapter 2.1: Numerical Data
3	M	8-Sep	Chapter 2.2: Categorical Data
3	W	10-Sep	R Lab: Summarizing Data
3	F	12-Sep	Chapter 3.1: Probability

4	M	15-Sep	Chapter 3.2: Conditional Probability
4	W	17-Sep	Review
4	F	19-Sep	Test 1
5	M	21-Sep	Chapter 4.1: The Normal Distribution
5	W	24-Sep	Chapter 4.1: The Normal Distribution
5	F	26-Sep	Chapter 4.3: The Binomial Distribution
6	M	28-Sep	Chapter 5.1 Point estimates
6	W	30-Sep	Chapter 5.2 Confidence intervals proportion
6	F	3-Oct	Chapter 5.2 Confidence intervals proportion
7	M	6-Oct	Review
7	W	8-Oct	Test 2
7	F	10-Oct	Chapter 5.3 Hypothesis Testing Proportion
*	M	13-Oct	Relax
*	W	15-Oct	Regroup
*	F	17-Oct	Reenergize
8	M	20-Oct	Chapter 5.3 Hypothesis Testing Proportion
8	W	22-Oct	Chapter 6.1 - Inferences for a Single Proportion
8	F	24-Oct	Chapter 6.2 Difference in proportions
9	M	27-Oct	Chapter 6.3 Goodness of Fit
9	W	29-Oct	Chapter 6.4: Test for Independence
9	F	31-Oct	R Lab: Inference for Categorical Data
10	M	3-Nov	Review
10	W	5-Nov	Test 3
10	F	7-Nov	Chapter 7.1 One-sample means
11	M	10-Nov	Chapter 7.1 One-sample means
11	W	12-Nov	Chapter 7.2 Paired Data
11	F	14-Nov	Chapter 7.3 Difference of 2 means
12	M	17-Nov	Chapter 7.5 ANOVA
12	W	19-Nov	R Lab: Inference for Numerical Data
12	F	21-Nov	Chapter: 8.1 Linear Regression
13	M	24-Nov	Chapter: 8.2 Least Squares
13	M	1-Dec	R Lab: Regression
13	W	3-Dec	Test 4
14	F	5-Dec	Review
14	W	10-Dec	Exam 2PM