Statistical Methods I
STAT 210 / Spring 2022

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Office: Trexler 270G

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Office Hours: 1:10-2:10 PM, Monday, Wednesday Friday, 12:00-1:00 PM, Thursday, and by appointment. All office hours will be conducted on Zoom. Please send me an email to schedule an appointment. You can email me to set up an appointment at a different time. Zoom Link: https://roanoke-edu.zoom.us/j/5403752449

Meeting Time: 10:50-11:50, Monday, Wednesday, Friday

Meeting Place: For the first two weeks of the semester we will meet on Zoom synchronously and for the remainder of the semester we will me in-person in 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 describing data using graphical and numerical methods. Building our descriptive techniques, we will learn probability theory to understand how to make statistical inferences. Though out 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.
…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.

Content:

- Producing Data
- Designing Experiment
- 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: At the end of each class period during which content is discussed, practice problems will be assigned. It is expected that students work all these problems. We will additionally have weekly HW assignments that I will collect and grade.

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, February 11th
Friday, March 2nd
Wednesday, March 30th
Monday, April 25th

Final Exam: The final exam will be cumulative and will be on Friday, April 29 at 8:30AM.

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

Tests	55%
Homework/Labs	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

MCSP Conversation Series: Attending at least two MCSP conversation series events is required. Within one week of the lecture, a one-page reflection paper will be due and will count in your HW grade. You find the upload link on Inquire.

Classroom Safety: Face coverings/masks must be worn over the mouth and nose by all students and instructors in classrooms and hallways of academic buildings. By wearing face coverings, we protect our college community and its most vulnerable members. Students who come to class without a face mask that is being worn properly will be asked to leave and will be readmitted only after they are wearing one.

If you have a temperature of 100.4 or higher or other coronavirus symptoms, don't come to class. Call Health Services IMMEDIATELY. Do not come to class or go to any public area on campus. Do keep up with all readings, assignments, and deadlines. In order for your absence to be excused, you must give Health Services permission to notify me that you

have consulted them about coronavirus symptoms. If Health Services informs you that you should isolate and not attend class for multiple days or weeks, inform me so that we can plan to keep you current in the course. All absences caused by consultation with Health Services about coronavirus symptoms or isolation ordered by Health Services will be excused.

Attendance: Attendance is required and expected and is crucial to be successful in this course. An absence that is not discussed with the instructor prior to class is considered unexcused. Regardless of whether the absence is excused or not, you are responsible for all the material covered in class.

Missed Test: I will not give make-up tests. If you miss a test and have discussed it with me before the class takes the test, I will use your final exam grade for replacement.

Make-up Work: No make-up work will be accepted. Any excused work will be replaced by the final exam.

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/

We will be collecting data using the mobile application Classroom Stats though out the semester. Please download this free app onto your phone. It is available for Android and iOS and you can easily find it in the app store.

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 (e.g. Mathematica may be allowed for some tests). 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.

Subject Tutoring, located on the lower level of Fintel Library (Room 5), is open 4 pm – 9 pm, Sunday – Thursday. We are a Level II Internationally Certified Training Center through the College Reading and Learning Association (CRLA). Subject Tutors are friendly, highly-trained Roanoke College students who offer free, one-on-one tutorials in a variety of general education and major courses such as: Business, Economics, Mathematics, INQ 240, Modern Languages, Lab Sciences, INQ 250, and Social Sciences (see all available subjects at www.roanoke.edu/tutoring). Tutoring sessions are available inperson or online in 30 or 60-minute appointments (please specify if you prefer to meet with a tutor online or in-person when you make your appointment). All in-person appointments will maintain at least 6 feet of physical distance, desks will be cleaned between appointments, and masks must be worn in all indoor, public spaces. In the event that all classes go online this semester, Subject Tutoring will remain available online, too. Schedule an appointment at www.roanoke.edu/tutoring or contact us at 540-375-2590 or subject_tutoring@roanoke.edu. We hope to see you soon!

Accessible Education Services (AES) is located in the Goode-Pasfield Center for Learning and Teaching in Fintel Library. 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 the Assistant Director of Academic Services for Accessible Education, at 540-375-2247 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, AES at your earliest convenience to schedule an appointment.

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

Week	Day	Date	Topic
1	W	19-Jan	Introduction

1	F	21-Jan	Chapter 1: Intro to Data
2	M	24-Jan	Chapter 1: Intro to Data
2	W	26-Jan	Chapter 2.1: Numerical Data
2	F	28-Jan	Chapter 2.1: Numerical Data
3	M	31-Jan	Chapter 2.2: Categorical Data
3	W	2-Feb	R Lab: Summarizing Data
3	F	4-Feb	Chapter 3.1: Probability
4	M	7-Feb	Chapter 3.2: Conditional Probability
4	W	9-Feb	Review
4	F	11-Feb	Test 1
5	M	14-Feb	Chapter 4.1: The Normal Distribution
5	W	16-Feb	Chapter 4.1: The Normal Distribution
5	F	18-Feb	Chapter 4.3: The Binomial Distribution
6	M	21-Feb	Chapter 5.1 Point estimates
6	W	23-Feb	Chapter 5.2 Confidence intervals proportion
6	F	25-Feb	Chapter 5.2 Confidence intervals proportion
7	M	28-Feb	Review
7	W	2-Mar	Test 2
7	F	4-Mar	Chapter 5.3 Hypothesis Testing Proportion
*	M	7-Mar	Relax
*	W	9-Mar	Regroup
*	F	11-Mar	Reenergize
8	M	14-Mar	Chapter 5.3 Hypothesis Testing Proportion
8	W	16-Mar	Chapter 6.1 - Inferences for a Single Proportion
8	F	18-Mar	Chapter 6.2 Difference in proportions
9	M	21-Mar	Chapter 6.3 Goodness of Fit
9	W	23-Mar	Chapter 6.4: Test for Independence
9	F	25-Mar	R Lab: Inference for Categorical Data
10	M	28-Mar	Review
10	W	30-Mar	Test 3
10	F	1-Apr	Chapter 7.1 One-sample means
11	M	4-Apr	Chapter 7.1 One-sample means
11	W	6-Apr	Chapter 7.2 Paired Data
11	F	8-Apr	Chapter 7.3 Difference of 2 means
12	M	11-Apr	Chapter 7.5 ANOVA
12	W	13-Apr	R Lab: Inference for Numerical Data
12	F	15-Apr	No Class - Good Friday

13	M	18-Apr	Chapter: 8.1 Linear Regression
13	W	20-Apr	Chapter: 8.2 Least Squares
13	F	22-Apr	R Lab: Regression
14	M	25-Apr	Test 4
14	T	26-Apr	Review
EXAM	M	29-Apr	Exam 8:30AM