Statistical Methods I
STAT 210 / Fall 2021

Professor: Dr. Maggie Rahmoeller (aka Dr. Maggie)
Office: Trexler 270B
Email: rahmoeller@roanoke.edu

Class Meetings: MWF 9:40 – 10:40PM in Fintel 01

Office Hours: Available office hour times include:

Monday:	11AM – Noon, 3:30PM – 5PM
Tuesday/Thursday:	9AM – 2PM
Friday:	11AM – Noon (Except 9/10, 10/8, 11/5, & 12/3)

Required Texts: *OpenIntro Statistics,* 4th 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/book/os/

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

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.

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. To keep you from procrastinating and to measure understanding, an overwhelming majority of class days will begin with a "problem of the day". When you enter the classroom there will be a problem displayed for you to work and turn in. This problem will be due 5 minutes after the start of our class time regardless of when you enter the classroom. These problems of the day will make up your homework grade. Use office hours to chat through any questions you have about the practice problems.

You are expected to read the textbook before we cover the material in class.

Labs: We will have several labs throughout the semester that will focus on 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 24th
Wednesday, October 13th
Wednesday, November 10th
Wednesday, December 8th

Final Exam: The final exam will be cumulative and will be on December 15 from 8:30AM – 11:30AM.

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

Tests	50%
Homework	15%
Labs	20%
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 Policy: Regular attendance is expected. Most classes will be discussion-based and participation will depend on your involvement in class discussion. In-class discussions will be heavily centered around course readings, and thus to do well in class conversations, you must keep up with the reading. Although there is no "participation" component to your grade, a lack of participation could result in the lowering of your final grade by up to one grade letter.
Any absence that is not discussed with the instructor prior to the missed class is considered unexcused. Having more than two unexcused absences may result in a lowering of your final grade at the end of the semester. If you miss a peer review / workshop day, your grade on that paper will be reduced by one letter grade. When absent, excused or unexcused, you are responsible for all material covered in class.

If you have a temperature of 100.4 or higher or other COVID symptoms, don't come to class. Call Health Services IMMEDIATELY. Do not come to class or go to any public area on campus. In order for your absence to be excused, you must give Health Services permission to notify me that you have consulted them about COVID symptoms. If Health Services informs you that you should isolate and not attend class for multiple days, inform me so that we can make a 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 but you will need to do the work.

Masks
The College has issued a mask mandate for the start of the semester that requires masks to be worn in indoor common spaces such as our classroom. **For the health and safety of all members of our community, I will require all students to wear a mask in the classroom for the entire semester.** If you arrive without a mask, you will not be allowed to stay and may lose credit for attendance or in-class work. The Bookstore sells masks if you need to make a quick purchase.

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.

Late Work: I will not accept any late work.

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. Computers will be used in the classroom exclusively for academic purposes.

R Download: https://archive.linux.duke.edu/cran/

RStudio Download: https://www.rstudio.com/products/rstudio/download/#download

Academic Integrity System: Students are expected to adhere to the Academic Integrity policies of Roanoke College (https://www.roanoke.edu/inside/a-z_index/academic_integrity). All work submitted for a grade is to be your own work! Doing your own work and properly acknowledging the work of others is of utmost importance in the academic setting. Do not be afraid to use sources!! Part of academic writing (and any writing) is to use sources to increase your knowledge of the subject and provide evidence for your claims. But, proper citation is key! You must cite ANY sources used – whether you pull directly from the source, paraphrase the source, or summarize the content.

On Inclusion: I consider this classroom to be a place where you will be treated with respect, and I welcome individuals of all ages, backgrounds, beliefs, ethnicities, genders, gender identities, gender expressions, national origins, religious affiliations, sexual orientations, ability – and other visible and nonvisible differences. All members of this class are expected to contribute to a respectful, welcoming and inclusive environment for every other member of the class. I will gladly honor your request to address you by an alternate name or gender pronoun. Please advise me of this preference early in the semester so that I may make appropriate changes to my records.

Course Modification: The syllabus serves as a course guideline and is subject to revision. We may need to make changes as the semester progresses. All changes will be announced in advance.

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!

The Writing Center @ Roanoke College, located on the Lower Level of Fintel Library (Room 15), 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.

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 Becky Harman, 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, please contact Becky Harman at your earliest convenience to schedule an appointment and/or obtain your accommodation letter for the current semester.

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

Week	Day	Date	STAT 210
Week 1	1	Sept 1	Introduction
	2	Sept 3	Chapter 1: Intro to Data
Week 2	3	Sept 6	Chapter 1: Intro to Data
	4	Sept 8	Chapter 2.1: Numerical Data
	5	Sept 10	Chapter 2.1: Numerical Data
Week 3	6	Sept 13	Chapter 2.2: Categorical Data
	7	Sept 15	R Lab: Summarizing Data
	8	Sept 17	Chapter 3.1: Probability
Week 4	9	Sept 20	Chapter 3.2: Conditional Probability
	10	Sept 22	Review
	11	Sept 24	Test 1
Week 5	12	Sept 27	Chapter 4.1: The Normal Distribution
	13	Sept 29	Chapter 4.1: The Normal Distribution
	14	Oct 1	Chapter 4.3: The Binomial Distribution
Week 6	15	Oct 4	Chapter 5.1 Point estimates
	16	Oct 6	Chapter 5.2 Confidence intervals proportion
	17	Oct 8	Chapter 5.2 Confidence intervals proportion
Week 7	18	Oct 11	Review
	19	Oct 13	Test 2
	20	Oct 15	Chapter 5.3 Hypothesis Testing Proportion
FALL BREAK!!			
Week 8	21	Oct 25	Chapter 5.3 Hypothesis Testing Proportion
	22	Oct 27	Chapter 6.1 - Inferences for a Single Proportion
	23	Oct 29	Chapter 6.2 Difference in proportions
Week 9	24	Nov 1	Chapter 6.3 Goodness of Fit
	25	Nov 3	Chapter 6.4: Test for Independence
	26	Nov 5	R Lab: Inference for Categorical Data
Week 10	27	Nov 8	Review
	28	Nov 10	Test 3
	29	Nov 12	Chapter 7.1 One-sample means
Week 11	30	Nov 15	Chapter 7.1 One-sample means
	31	Nov 17	Chapter 7.2 Paired Data
	32	Nov 19	Chapter 7.3 Difference of 2 means
Week 12	33	Nov 22	Chapter 7.5 ANOVA
THANKSGIVING BREAK!!			
Week 13	34	Nov 29	R Lab: Inference for Numerical Data
	35	Dec 1	Chapter: 8.1 Linear Regression
	36	Dec 3	Chapter: 8.2 Least Squares
Week 14	37	Dec 6	R Lab: Regression
	38	Dec 8	Test 4
	39	Dec 10	Review
	Exam	Dec 15	Exam 8:30 – 11:30AM