STAT 210: Statistical Methods I Fall 2022

Contact Me	Meet with Me	Class Info
		
Name: Dr. Maggie **Pronouns:** She/Her/Hers **Email:** rahmoeller@roanoke.edu	**Office:** Trexler 270B **Student Hours:** Tues/Thurs 1:15-2:15PM Wed 2:30-3:30PM Or email me to meet at a different time!	**Location:** Miller 113 **Days:** MWF **Time:** 9:40-10:40AM

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. 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.

…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.

Your success in this class is important to me! We all learn differently and bring a variety of strengths and needs to the class. If there are aspects of the course that prevent you from learning or that make you feel excluded, please let me know as soon as possible. Together we'll develop strategies to meet both your needs and the requirements of the course.

Required Texts: *OpenIntro Statistics*, 4th edition, by David Diez, Mine Cetinkaya-Rundel, Christopher D Barr

You can buy a physical copy but you can also download the electronic copy for free! (https://www.openintro.org/book/os/)

Required 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/

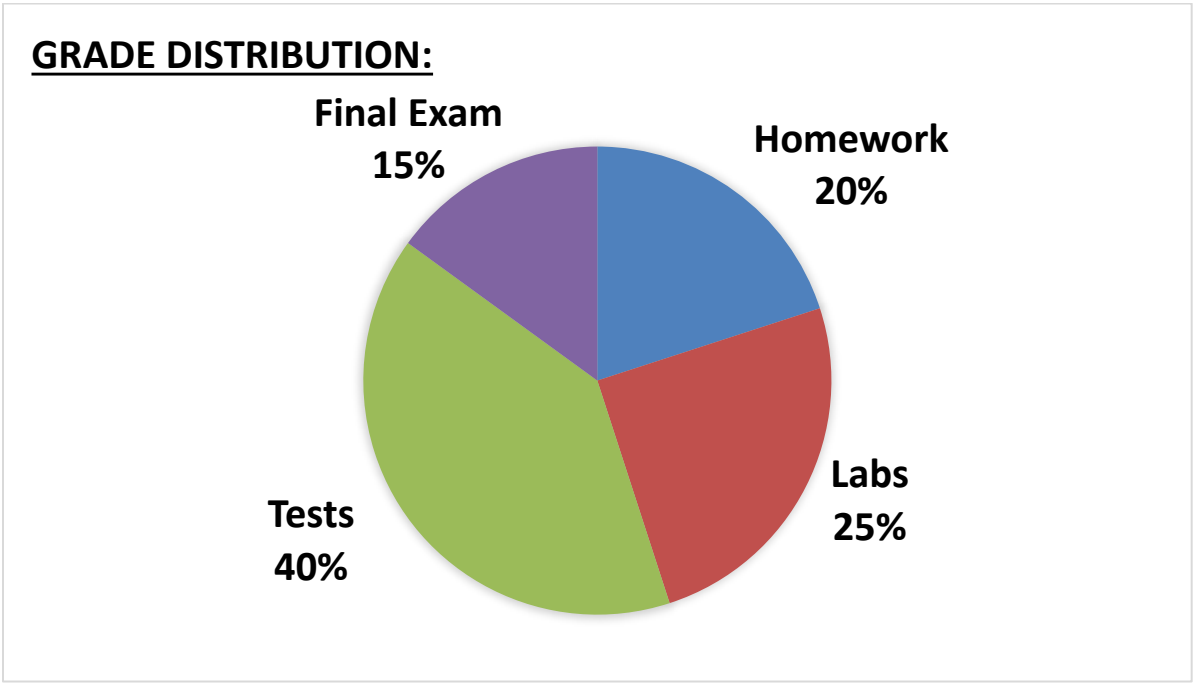
RStudio Download: https://www.rstudio.com/products/rstudio/download/#download

WARNING!!!!

You cannot get credit for this course if you have taken INQ 240 or if you come in with STAT-I credit, since 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.

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

GRADE DISTRIBUTION:



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

COURSE EXPECTATIONS

Class Structure: Most class days will consist of a short problem of the day (based on your assigned homework), new material, and working problems. We will always strive to have a more active learning environment, filled with class discussions and plenty of Q&A.
You are expected to treat all students in the class and me with courtesy and respect. Your comments to others should be factual, constructive, and free from harassing statements. You are encouraged to disagree with other students, but such disagreements need to be based upon facts and documentation (rather than prejudices and personalities). My goal is to promote an atmosphere of mutual respect in the classroom. Please let me know if you have suggestions for improving the classroom environment. (Source: Iowa State University)

Diversity and Inclusivity

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.

Attendance Policy: Our course's success depends on you attending class! If you miss class, you will miss community building, engaging conversations, and information that I deem worthy of your time! Plus, we will miss you!

However, life happens! You may get sick, desperately need a mental health day, or have a game scheduled. It will not be the end of the world if you miss a class very occasionally. At some point, though, missing class can be detrimental to success. So, do your best to be in class! Strive for perfect attendance!

What should you do if you have to miss class? Let me know ASAP! Communication is key! I don't need details (please, spare me the details!) but do let me know ahead of time, so we can make plans, if needed. If you cannot let me know ahead of time (emergencies do happen!), just let me know as soon as you can. Email is typically the best form of communication for me.

If you are sick (and contagious), please either stay home OR come to class wearing a mask (unless you have COVID symptoms). CDC guidelines currently (as of Aug 2022) say that once your symptoms are gone or have lightened considerably, you may go out and about if you are wearing a *good* mask (for at least 5 days). If you have symptoms or a fever, isolate. Always follow Roanoke College guidelines for COVID. And be sure to use Health Services on campus!

Late Work: Whether or not to accept late work is always a tough decision. Life happens – and occasionally we need more time to complete tasks! But, sometimes turning in an assignment late causes more complications than benefits. Homework in this class consists of *practice problems* (best if you do them by class) and *Problems of the Day* (you will complete in the first 5 minutes of class). If you don't do your practice problems, the Problems of the Day will be much harder…and more time-consuming (and you only have 5 minutes!). And if you miss a Problem of the Day, then it's a lot more work for me to come up with another assignment for you, plus it's not fair for the other students who were there on time. If you don't complete the labs on time, then it's only a detriment to me…the grader. It's much easier to grade an assignment all at once for the class, rather than a handful at a time. Tests can be rescheduled but do your best to take them on their designated days. Try to save rescheduling tests for more serious excuses.

In other words, I can grant more leeway on certain types of assignments, those with *soft* deadlines. But *hard* deadlines cannot be changed. I would say that Problems of the Day have *hard* deadlines. But labs have *soft* deadlines.

The best thing you can do is *communicate* with me. Let me know if you have concerns about turning in an assignment on time – I will do my best to work with you.

Academic Integrity: 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.

COURSE ASSIGNMENTS

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 student hours to chat through any questions you have about the practice problems.

MCSP Conversation Series: The MCSP+ department and Roanoke College offer many opportunities to engage with mathematical ideas outside of classes. Members of this class are encouraged to attend many of these activities, however attending at least two is mandatory. Examples include MCSP Conversation Series talks (most will likely be offered through Zoom this semester) and student research showcases (should they happen this semester) - if you're unsure if a given activity makes sense for this purpose, please email me to ask.

Within one week of attendance you must submit a brief response to the activity. This should not simply be a regurgitation of the content, but rather a personal contemplation of the experience. The prompt for this reflection is on Inquire.

Additional participation (and submission of reflection papers) will earn you extra credit, with .5% added to your course average for each attended, up to 2% total. In addition, individually, you may request that other appropriate events count.

Labs: We will have several labs throughout the semester that will focus on learning statistical computing using RStudio.

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

Friday, September 23rd

Wednesday, October 12th

Wednesday, November 9th

Wednesday, December 7th

Final Exam: The final exam will be cumulative and will be on December 14 from 8:30AM – 11:30AM.

RESOURCES

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.

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.

Tentative Course Schedule

Week	Date	STAT 210
Week 1	Aug 31	Introduction
	Sept 2	Chapter 1: Intro to Data
Week 2	Sept 5	Chapter 1: Intro to Data
	Sept 7	Chapter 2.1: Numerical Data
	Sept 9	Chapter 2.1: Numerical Data
Week 3	Sept 12	Chapter 2.2: Categorical Data
	Sept 14	**R Lab: Summarizing Data**
	Sept 16	Chapter 3.1: Probability
Week 4	Sept 19	Chapter 3.2: Conditional Probability
	Sept 21	Review
	Sept 23	**Test 1**
Week 5	Sept 26	Chapter 4.1: The Normal Distribution
	Sept 28	Chapter 4.1: The Normal Distribution
	Sept 30	Chapter 4.3: The Binomial Distribution
Week 6	Oct 3	Chapter 5.1 Point estimates
	Oct 5	Chapter 5.2 Confidence intervals proportion
	Oct 7	Chapter 5.2 Confidence intervals proportion
Week 7	Oct 10	Review
	Oct 12	**Test 2**
	Oct 14	Chapter 5.3 Hypothesis Testing Proportion
FALL BREAK!!!		
Week 8	Oct 24	Chapter 5.3 Hypothesis Testing Proportion
	Oct 26	Chapter 6.1 - Inferences for a Single Proportion
	Oct 28	Chapter 6.2 Difference in proportions
Week 9	Oct 31	Chapter 6.3 Goodness of Fit
	Nov 2	Chapter 6.4: Test for Independence
	Nov 4	**R Lab: Inference for Categorical Data**
Week 10	Nov 7	Review

	Nov 9	**Test 3**
	Nov 11	Chapter 7.1 One-sample means
Week 11	Nov 14	Chapter 7.1 One-sample means
	Nov 16	Chapter 7.2 Paired Data
	Nov 18	Chapter 7.3 Difference of 2 means
Week 12	Nov 21	Chapter 7.5 ANOVA
THANKSGIVING BREAK!!!		
Week 13	Nov 28	**R Lab: Inference for Numerical Data**
	Nov 30	Chapter: 8.1 Linear Regression
	Dec 2	Chapter: 8.2 Least Squares
Week 14	Dec 5	**R Lab: Regression**
	Dec 7	**Test 4**
	Dec 19	Review
Final Exam	Dec 14	Exam 8:30 – 11:30AM