Statistics in an Online World
HNRS 240 / Spring 2023

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Office Hours: 12:00-1:00, Monday, Wednesday Friday, and by appointment. Please send me an email to schedule an appointment if you need to meet at another time.

Zoom Link: https://roanoke-edu.zoom.us/j/5403752449 Meeting

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

Meeting Place: Maxey 106.

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

Supplementary Reading:

- Mathematical Statistics with Applications by Wackerly, Mendenhall and Scheaffer (Chapter 15 provided by instructor)
- "College students' social networking experiences on Facebook" by Pempek, Tiffany A., Yevdokiya A. Yermolayeva, and Sandra L. Calvert. Journal of Applied Developmental Psychology 30.3 (2009): 227-238.
- EasyWriter (Ed. 6), by Lunsford, Andrea A.

Course Objective: The objective of this course is to explore probability and statistics through social media, smartphone use, and online retailers. The focus of this course will be asking questions and then developing the statistical techniques necessary to answer those questions. Armed with probability theory and statistical techniques we will determine how to summarize, analyze, and communicate key features of a data set. As applications, we will investigate how to quantify and improve the effectiveness of technology including websites and social media, how to use statistics to help businesses improve their presence on Facebook, and how online retailers and social media sites use consumer data.

Learning Outcomes:

1. Students will be able to use the methodologies of statistics to
   a. Investigate a topic of interest and make decisions based on the results.
   b. Design and carry out a simple statistical experiment.
   c. Critique news stories and journal articles that include statistical information. In the critique students will recognize variability and its consequences, identify potential sources of bias and both proper and improper cause and effect inference.
2. Students will be able to articulate the importance and limitations of using data and statistical methods in decision making.
3. Students will be able to write about course topics clearly and effectively.
4. Students will be able to interpret quantitative information related to the course topic.
5. Students will be able to connect course content to communities beyond the classroom.

Course Topics:

- Descriptive Statistics
- Graphical Methods
- Correlation and Regression
- Estimation

- Elementary Probability
- Test of Hypothesis (z-tests, t-tests and Chi-square test)

- Non-parametric Statistics
- Confidence Intervals
- Analysis of Variance

Homework: Homework will be assigned regularly. The problems will be posted on Inquire with their due date. The homework will be graded for correctness and completeness.

Additionally, there will be reading assignments, quizzes, and reflections.

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

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

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Friday, February 10th
Wednesday, March 1st
Wednesday, March 29th
Monday, April 24th

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Project: Due Tuesday, April 25th - In this project you will play the role of a member of a consulting team working with a local business or organization. You goal will be to help them understand how to improve their reach to constituents on Facebook. This project will be completed throughout the semester as you work towards presenting your business partner with a polished report that explains your statistical findings. Your first job will be to contact the organization and understand what goals they have for the impact of their Facebook page and what questions they have about how users are interacting with their page. You will then determine how to answer those questions using statistical methods and meet with another group to discuss your plan. Next your team will request relevant data from your business partner and analyze the data. The final project will be a report to your business partner that clearly articulates your statistical findings and their practical meanings. Before submitting your project to your business partner, you will have a peer review with another group to ensure your report is thoughtful and understandable.

Final Exam: The final exam will be cumulative and will be on Saturday, May 29 at 8:30AM

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

Tests	50%
Homework/ Labs/Quizzes	20%
Project	15%
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: 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: 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: We will be using Minitab for our statistical computing. You can access the web application free using your Roanoke College email. https://app.minitab.com/

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! I encourage collaboration on homework but when you write up your solutions you should never be looking at someone else's work. 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.

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.

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 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.

Schedule: This is the intended schedule but could change. Please check Inquire for any updates or changes.

Week	Day	Date	Topic
1	W	18-Jan	Introduction
1	F	20-Jan	Chapter 1: Intro to Data
2	M	23-Jan	Chapter 1: Intro to Data
2	W	25-Jan	Chapter 2.1: Numerical Data
2	F	27-Jan	Chapter 2.1: Numerical Data
3	M	30-Jan	Chapter 2.2: Categorical Data
3	W	1-Feb	Lab #1
3	F	3-Feb	No Class
4	M	6-Feb	Chapter 3.1: Probability
4	W	8-Feb	Chapter 3.2: Conditional Probability
4	F	10-Feb	Test 1
5	M	13-Feb	Chapter 4.1: The Normal Distribution
5	W	15-Feb	Chapter 4.1: The Normal Distribution
5	F	17-Feb	Chapter 4.3: The Binomial Distribution
6	M	20-Feb	Chapter 5.1 Point estimates
6	W	22-Feb	Chapter 5.2 Confidence intervals proportion
6	F	24-Feb	Chapter 5.2 Confidence intervals proportion
7	M	27-Feb	Review
7	W	1-Mar	Test 2
7	F	3-Mar	Chapter 5.3 Hypothesis Testing Proportion
*	M	6-Mar	Relax
*	W	8-Mar	Regroup
*	F	10-Mar	Reenergize
8	M	13-Mar	Chapter 5.3 Hypothesis Testing Proportion
8	W	15-Mar	Chapter 6.1 - Inferences for a Single Proportion
8	F	17-Mar	Chapter 6.2 Difference in proportions
9	M	20-Mar	Chapter 6.3 Goodness of Fit
9	W	22-Mar	Chapter 6.4: Test for Independence
9	F	24-Mar	Lab #2
10	M	27-Mar	Review
10	W	29-Mar	Test 3
10	F	31-Mar	Chapter 7.1 One-sample means
11	M	3-Apr	Chapter 7.1 One-sample means
11	W	5-Apr	Chapter 7.2 Paired Data
11	F	7-Apr	No Class – Good
12	M	10-Apr	Chapter 7.3 Difference of 2 means
12	W	12-Apr	Chapter 7.5 ANOVA

12	F	14-Apr	Inference Review
13	M	17-Apr	Chapter: 8.1 Linear Regression
13	W	19-Apr	Chapter: 8.2 Least Squares
13	F	21-Apr	Project Day
14	M	24-Apr	Test 4
14	T	25-Apr	Review
EXAM	Sat	29-Apr	Exam 8:30am