

**Statistics in an Online World - Online**  
HNRS 240 / Fall 2020

**Instructor:** Adam Childers [childers@roanoke.edu](mailto:childers@roanoke.edu)

**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 AM, Monday, Wednesday, Friday

**Meeting Place:** Olin 210 – We are in the theatre; this should be fun!

**Required Texts:** *OpenIntro Statistics Fourth Edition* by David Diez, Mine Cetinkaya-Rundel, Christopher D Barr  
I would recommend buying a physical copy but 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

**Structure of the course:** We will be meeting through live Zoom sessions and through prerecorded videos. See Inquire to find out if we are meeting live – it will always be posted at least a day in advance.

**Homework:** There will be reading assignments, problems assigned, and reflections. You can find all of them and their due dates on Inquire.

**Labs:** We will have several labs throughout the semester that will focus learning statistical computing using Minitab Express.

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

Friday, September 11<sup>th</sup>  
 Wednesday, September 30<sup>th</sup>  
 Wednesday, October 21<sup>st</sup>  
 Friday, November 13<sup>th</sup>

**Project: Due Monday, November 16<sup>th</sup>** In this project you will play the role of a member of a consulting team working with a local business or organization. Your 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. Finally, you will give an oral presentation to the class on your findings.

**Final Exam:** The final exam will be cumulative and will be on November 20<sup>th</sup> at 8:00AM.

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

Tests	50%
Homework/Mintab Express Labs	15%
Project	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:** 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 program Minitab Express will be used throughout the semester in the classroom and on assignments. Cell phones are expected to be turned off before entering the class. There is no appropriate reason for having a cell phone out in class. Computers will be used in the classroom exclusively for academic purposes.

You can get a free copy of Minitab Express through Roanoke College following the link:  
<https://forms.roanoke.edu/minitab-license>

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](http://www.roanoke.edu/tutoring)). Tutoring sessions are available in-person 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](http://www.roanoke.edu/tutoring) or contact us at 540-375-2590 or [subject\\_tutoring@roanoke.edu](mailto: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 Laura Leonard, Assistant Director of Academic Services for Accessible Education, at 540-375-2247 or by e-mail at [aes@roanoke.edu](mailto: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 Laura Leonard 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	HNRS 240
Online	Week 1	1	19-Aug	Introduction
		2	21-Aug	Chapter 1: Intro to Data
	Week 2	3	24-Aug	Chapter 1: Intro to Data
		4	26-Aug	Chapter 2.1: Numerical Data
		5	28-Aug	Chapter 2.1: Numerical Data
	Week 3	6	31-Aug	Chapter 2.2: Categorical Data
		7	2-Sep	Minitab Lab #1/Review
		8	4-Sep	Chapter 3.1: Probability
In-Person	Week 4	9	7-Sep	Chapter 3.2: Conditional Probability
		10	9-Sep	Review
		11	11-Sep	Test 1
	Week 5	12	14-Sep	Chapter 4.1: The Normal Distribution
		13	16-Sep	Chapter 4.1: The Normal Distribution
		14	18-Sep	Chapter 4.3: The Binomial Distribution
	Week 6	15	21-Sep	Chapter 5.1 Point estimates
		16	23-Sep	Chapter 5.2 Confidence intervals proportion

		17	25-Sep	Chapter 5.2 Confidence intervals proportion
	Week 7	18	28-Sep	Review
		19	30-Sep	Test 2
		20	2-Oct	Chapter 5.3 Hypothesis Testing Proportion
	Week 8	21	5-Oct	Chapter 5.3 Hypothesis Testing Proportion
		22	7-Oct	Chapter 6.1 - Inferences for a Single Proportion
		23	9-Oct	Chapter 6.2 Difference in Proportions
	Week 9	24	12-Oct	Chapter 6.3 Goodness of Fit
		25	14-Oct	Chapter 6.4 Testing for Independence
		26	16-Oct	Minitab Lab #2
	Week 10	27	19-Oct	Review
		28	21-Oct	Test 3
		29	23-Oct	Chapter 7.1 One-sample means
	Week 11	30	26-Oct	Chapter 7.1 One-sample means
		31	28-Oct	Chapter 7.2 Paired Data
		32	30-Oct	Chapter 7.3 Difference of 2 means
	Week 12	33	2-Nov	Chapter 7.5 ANOVA
		34	4-Nov	Inference Review
		35	6-Nov	Chapter: 8.1 Linear Regression
	Week 13	36	9-Nov	Chapter: 8.2 Least Squares
		37	11-Nov	Review/Project
		38	13-Nov	Test 4
	last day	39	16-Nov	Project Due/Review
		Exam	20-Nov	Final at 8AM