

INQ 240 Statistics & Sports Industry Spring 2019

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Office Hours: Monday 4:00 to 5:00, Tuesday/Thursday 8:30 to 10:00 and Wednesday 8:30 to 11:30.

All office hours are by appointment. To make an appointment, please use the link:

<https://rreakes24.youcanbook.me>

If these hours do not work with your schedule, please call or email me to set up an appointment.

Text: *Elementary Statistics: Picturing the World, (6th edition),*
by Ron Larson and Betsy Farber

Required Materials: All students will need a TI-84 graphing calculator.

Note: Students who have completed Stat 202 may not take this course for credit. Students must receive a C or better in this course or Math 111 to declare a major in Business Administration. You may wish to discuss grade requirements with your advisor with regards to your major.

Academic Integrity: You are expected to be familiar with the Academic Integrity Code outlined in the booklet, *Academic Integrity at Roanoke College.*

https://www.roanoke.edu/inside/a-z_index/academic_affairs/academic_integrity

- 1) The use of any electronic device other than a calculator during a quiz or exam is strictly prohibited. Any use of such devices during a quiz or exam will be considered a breach of academic integrity. You will not be allowed to share a calculator.
- 2) Cell phones must be turned off prior to entering the classroom. You are not to either send or receive text messages during class!
- 3) You are expected to do all work graded for accuracy independently. This includes tests, quizzes, and graded practice problems. You are allowed to work alone, with a partner or a group on the daily independent practice problems which will only be checked for completion.

Course Objective: Students will gain an understanding of how decision making is accomplished using modern statistical techniques. Topics include descriptive statistics, graphical techniques, elementary probability, estimation, inferential statistics, linear correlation, and regression. Quantitative reasoning will also be emphasized.

Course Outcomes: By the end of this course, successful students will be able to:

- 1) use the methodologies of statistics to investigate a topic of interest and make decisions based on the results,
- 2) use the methodologies of statistics to design and carry out a simple statistical experiment,
- 3) use the methodologies of statistics to 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,
- 4) articulate the importance and limitations of using data and statistical methods in decision making,
- 5) write about course topics clearly and effectively, and
- 6) interpret quantitative information related to the course topic.

Policy on expected number of hours of work per week: Per the Academic Catalog, "For each one-unit course, students are expected to complete 12 hours of work inside and outside of class each week." Realistically, this may vary due to the strength of the background of each individual student with respect to course content.

Grading:

Accuracy of Graded Practice Problems:	10%
Completion of Independent Practice Problems:	10%
Written Work:	10%
Tests:	70%

Grades will be assigned using the scale below:

A	93-100	C	73-76
A-	90-92	C-	70-72
B+	87-89	D+	67-69
B	83-86	D	63-66
B-	80-82	D-	60-62
C+	77-79	F	Below 60

Testing Policy:

We will use Mastery-Based Testing rather than Points-Based Testing. Mastery-based testing is very different from what you are used to - do not hesitate to ask me questions! You will only receive credit for answers that demonstrate you completely understand (have mastered) a topic. But you will get MANY chances to display mastery throughout the semester with NO PENALTY for earlier attempts.

- The course has been summarized by 16 topics.
- Your mastery of questions on these topics is assessed through the working of problems each week and during the final exam period.
- Each problem submitted is graded as either “Mastered” or “Not Mastered”. A grade of Mastery indicates that you have demonstrated full understanding of the concept being tested and further work on the topic is unnecessary.
- Once you have mastered a topic, you need not attempt it again.
- There is no penalty for multiple attempts taken to achieve mastery.
- Mastery does not mean perfect! It means you understand and can demonstrate all fundamentals of the topic and are proficient at the level desired for the course
- Your overall test grade is determined by the number of topics you have mastered illustrated in the table below:

# Mastered	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Mastery Grade	100	95	90	85	80	75	70	65	60	55	50	45	40	35	30	25

- All students are required to attempt to master topics the first time in class on the date listed in the course schedule.
- Retrying to master the topics after the first attempt may be done any time after the first attempt either in class on mastery opportunity days or during office hours.
 - To retry a topic in class you will request which topics you want to attempt to master using a Google Form link sent to you via email or use the link in Inquire. This request must be submitted by NOON the day prior to the mastery opportunity class.
 - To retry a topic during office hours, you must book an appointment during office hours. If my posted office hours do not work with your schedule, you may email me to set up a time that works for both of us.

Written Work:

MCSP Conversation Series: The Department of Mathematics, Computer Science and Physics offers a series of

discussions that appeal to a broad range of interests related to these fields of study. These co-curricular sessions will engage the community to think about ongoing research, novel applications and other issues that face our discipline. Members of this class are invited to be involved with all of these meetings; however participation in at least one of these sessions is mandatory. After attending, students will submit a one page paper within a week reflecting on the discussion. This should not simply be a regurgitation of the content, but rather a personal contemplation of the experience. This does not have to be a formal paper. This reflection paper will be counted as 10% of your written work grade. Please submit electronically by attaching your paper to an email send to: reakes@roanoke.edu.

“Where’s the Data Come From” Papers: You must find articles about sports you are interested in that uses data analysis to make or prove a point. In the article you must find the data set or a description of the data set used to support the authors claim and what sampling technique was used to collect the data. You must submit a written report fully describing the author's data collecting techniques using the vocabulary of a statistician. You are required to submit written reports for 3 articles during the semester. The due dates are listed in the course schedule. Each report is 10% of your written work grade. Please submit electronically by attaching your paper to an email send to: reakes@roanoke.edu.

Sports Article using Data Analysis Project: After reading articles using data analysis to support an author’s claim, you will become the author. Your task will be to use proper techniques to collect, organize, visualize, analyse and interpret data. You will use these results to write an interesting sports article which uses your results of your statistical study to prove or disprove a claim. The article will represent 60% of your written work grade. Please submit electronically by attaching your paper to an email send to: reakes@roanoke.edu.

Late Work Policy: Independent practice problems will be collected the day they are due and checked for completion. This work will only be accepted on the day it is due. No late papers will be accepted without arrangements approved prior to absence OR without written documentation from a college official. Graded practice problems will be checked for accuracy and may be submitted until solved correctly. They will not be accepted after the last day our class meets prior to the final exam. All written work needs to be submitted on the due date by 11:59 pm the day its due! No late papers will be accepted without arrangements approved prior to absence OR without written documentation from a college official.

Attendance: Attendance is critical to the understanding of the material in the course; it is both required and expected. Any absence that is not discussed with the instructor prior to the missed class is considered unexcused. I will assume that if you accumulate 3 unexcused absences you are not interested in completing the course and will drop you from the class with a grade of DF (dropped-failing) recorded, regardless of your current average in the course. You, your advisor, and the registrar will receive a warning email at your second unexcused absence. When absent, excused or unexcused, you are responsible for all material covered in class. Work missed due to either an unexcused or excused absence can only be made up when arrangements are made in advance of the absence.

Subject Tutoring: Subject Tutoring is a CRLA Nationally Certified Program located on the lower level of Fintel Library in room 005. Subject Tutoring offers individual appointments in 30-minute intervals for Lab Sciences, Modern Languages, Math and CPSC, Social Sciences, Business and Economics. Hours are Sunday - Thursday 4 p.m. - 9 p.m. For a list of tutorials or to make an appointment, go to www.roanoke.edu/tutoring.

Tentative Course Schedule:

Day	Date	Topic	Sections	Topic(s)	Assignment
Tues	1/15			Introduction to Course	
		1	1.1	Statistics Vocabulary	pgs 6-7 11-19 odd, 25-33 odd
		1	1.2	Types and Levels of Data	pgs 13-14 7-19 odd
Thur	1/17	1	1.3	Data Collection, Statistical Study	pgs 25-26 19-29 odd
				Intro to "Where's the Data Project" (Mrs Piper?)	
Tues	1/22	2	2.1	Frequency Distributions, Histograms	pgs 49-51 11,13,15,19,25, View 29 & 31 on TI84
		2		Bar Graphs, Line Graphs, Circle Graphs, Stem & Leaf Plots	pgs 62-65 5-9 all, 9,11,13-16 17,19 & View 31 on TI84
Thur	1/24	3	2.3	Mean, Median, Mode	pgs 75-77 17-21 odd, 31,33
		3	2.5	Quartiles and Box-and-Whisker Plots,	pgs 109-110 11a, 13a,15,25,27
Tues	1/29	3	2.4	Mean, Variance and Standard Deviation of a Data Set and a Distribution	Pgs 93-95 13-23 odd
Thur	1/31	4	9.1	Scatter Plots & Correlation Coefficient	Pgs 482-483 9-18 all 21-25 odd
		4	9.2	Linear Regression and Predictions	Pgs 491 17-21 odd
				Required Mastery Opportunity for Topics 1-3	
				Where's The Data Project Article # 1 Due	
Tues	2/5	5	3.1	Intro to Probability	Pgs 140-145 15,17,29,31,33, 37-49 odd, 61-67 odd,71,73,76
		5	3.3	The Addition Rule for Probability	Pgs 162-165 9-12 all, 13-17 odd, 23,25
Thur	2/7	5	3.4	Finding the Number of Outcomes	Pg 141 25-28 all Pgs 174-175 19-25 odd
Tues	2/12	5	3.2	The Multiplication Rule for Probability	Pgs 152-155 7,8,23,25,27,29
		6	4.1	Probability Distributions	Pgs 197-198 9-18 all,19-23 odd, 29,31
Thur	2/14			Required Mastery Opportunity for Topics 4 & 5	
				Mastery Redo Opportunity for Topics 1-3	
Tues	2/19	6	4.2	Binomial Probability Distributions	Pages 211-212 15,17,23,25,27,29
Thur	2/21	7	5.1	Introduction to the Normal Distribution	Pgs 242-243 10-16 all, 17-23 odd,27,33,37,39
Tues	2/26	7		Normal Distributions: Finding Probabilities	Pgs 249-250 7-15 odd
		7		Normal Distributions: Finding Values	Pgs 254-259 17-21 odd,31,33,37
Thur	2/28			Required Mastery Opportunity for Topics 6 & 7	
				Mastery Redo Opportunity for Topics 1-5	
				Where's The Data Project Article # 2 Due	
Tues	3/5			Spring Break	

Thur	3/7			Spring Break	
Tues	3/12	8	5.4	Normal Distribution and the Central Limit Theorem	Pgs 269-270 9,27,29,31,35
		8	5.5	Normal Binomial Distributions	Pgs 281-282 17-27 odd
Thur	3/14	9	6.1	Confidence Interval for a Mean	Pg 306 36-39 odd
				Confidence Interval for a Proportion	Pgs 325-326 11-15 odd,23
Tues	3/19	10	7.2	Hypothesis Test for One Mean	Pgs 3765-376 31-41 odd
Thur	3/21			Project Introduction	
				Required Mastery Opportunity for Topics 8-10	
				Mastery Redo Opportunity for Topics 1-8	
				Where's The Data Project Article # 3 Due	
Tues	3/26	11	7.4	Hypothesis Test for One Proportion	Pgs 391-392 9-15 odd
Thur	3/28	12	8.1	Hypothesis Test for Two Means	Pgs 425-426 15,17,19,23
		13	8.4	Hypothesis Test for Two Proportions	Pgs 451-452 7,9,11,13
Tues	4/2	14	9.3	Confidence Interval for Linear Regression	Pgs 504-508 21,23,25
		14	9.3	Hypothesis Test for Linear Regression	Pgs 504-508 35,36
Thur	4/4			Project Work Day	
				Required Mastery Opportunity for Topics 11-14	
				Mastery Redo Opportunity for Topics 1-10	
Tues	4/9	15		Chi Square Test for Good Fit	Pgs 532-533 7,9,11
		15		Chi Square Test of Independence	Pgs 544-545 13,17,15
Thur	4/11	16		ANOVA Test for Multiple Means	Pgs 565-566 5,7,9
				Project Work Day	
Tues	4/16			Project Work Day	
Thur	4/18			Project Work Day	
				Required Mastery Opportunity for Topics 15 & 16	
				Mastery Redo Opportunity for Topics 1-14	
Tues	4/23			Article Project Due	Due by 11:59 pm
Thur	4/25		Block 10	Final Exam: Mastery Redo Opportunity for Topics 1 - 16	8:30 am to 11:30 am
Fri	4/26		Block 11	Final Exam: Mastery Redo Opportunity for Topics 1 - 17	2:00 pm to 5:00pm
Wed	4/24		Block 12	Final Exam: Mastery Redo Opportunity for Topics 1 - 18	2:00 pm to 5:00pm

Topics:

All graphs will be done electronically on calculator and checked by instructor unless otherwise specified.

Topic Number	Title	Description
1	Statistical Study Vocabulary & Data Collection	<ol style="list-style-type: none"> 1) Identify Population and Variable 2) Data Types and Levels 3) Data Collection Techniques
2	Visualizing Data with Graphs and Charts	<p>Be able to create and interpret using technology:</p> <ol style="list-style-type: none"> 1) Frequency Distributions & Histograms 2) Stem & Leaf Plots 3) Dot Plots 4) Bar Graphs 5) Line Graphs 6) Circle Graphs
3	Describing Data with Numbers	<p>Be able to find and interpret using technology the following measures:</p> <ol style="list-style-type: none"> 1) Mean 2) Median 3) Mode 4) Range 5) InterQuartile Range 6) Variance 7) Standard Deviation
	Linear Correlation & Regression	<p>Be able to create or find and interpret using technology:</p> <ol style="list-style-type: none"> 1) Scatter Plots 2) Linear Correlation Coefficient 3) Linear Regression Equation
5	Probability	<ol style="list-style-type: none"> 1) Probability Vocabulary 2) Probability of a Single Event 3) Probability of a Single Event using AND 4) Probability of a Single Event using OR 5) Find the Number of Outcomes of Multiple Events 6) Find the Number of Outcomes of Multiple Events
6	Binomial Distributions	<ol style="list-style-type: none"> 1) Vocabulary and Rules of Probability Distributions 2) Vocabulary and Rules of Binomial Probability Distributions 3) Creating Binomial Distributions 4) Creating a Histogram of a Binomial Distribution 5) Using a Binomial Distribution to Find Probabilities
7	Normal Distributions	<ol style="list-style-type: none"> 1) Vocabulary and Rules of Normal Probability Distributions 2) Creating the Standard and a Normal Distribution 3) Creating the Standard and a Normal Distribution Curve 4) Using a Normal Distribution to Find Probabilities w/ & w/o TI84 5) Using a Normal Distribution to Find Values w/ & w/o TI84
8	Normalizing Data	<ol style="list-style-type: none"> 1) Normalize Data using the Central Limit Theorem 2) Normalize Data using a Binomial Distribution

9	Confidence Intervals	<ol style="list-style-type: none"> 1) Create a Z-Confidence Interval for a Mean 2) Create a Z-Confidence Interval for a Proportion
10	Hypothesis Tests for a Mean	Use a Hypothesis Z-Test for a Mean (One Sample)
11	Hypothesis Tests for a Proportion	Use a Hypothesis Z-Test for a Proportion (One Sample)
12	Hypothesis Tests for Two Means	Use a Hypothesis Z-Test for Two Means (Two Samples)
13	Hypothesis Tests for Two Proportions	Use a Hypothesis Z-Test for Two Proportions (Two Samples)
14	Confidence Interval and Hypothesis Test for Linear Regression	<ol style="list-style-type: none"> 1) Create a Linear Regression Confidence Interval Prediction 2) Use a Hypothesis T-Test for Linear Regression
15	Chi-Square Tests	<ol style="list-style-type: none"> 1) Use a Chi-Square Test for Goodness-of-Fit 2) Use a Chi-Square Test for Independence
16	ANOVA	Use and ANOVA Test for More than Two Means