

Statistical Methods II

STAT 220/ Spring 2020

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Office Hours: 12-1PM, Monday, Wednesday Friday,
and by appointment.

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

Meeting Place: Lucas 207

Required Text: *The Statistical Sleuth – Third Edition* by Ramsey and Schafer

Course Objective: The objective of this course is to understand how to use statistical methods to describe data and make statistical inferences. Building on the techniques from STAT 210 (or INQ 240), we will ask more sophisticated research questions and generalize our statistical methods. We will expand our understanding of simple linear regression by studying inferences for regression and multiple regression. We will take a closer look at one-way ANOVA and then consider two-way ANOVA. We will look carefully at assumptions for statistical methods and learn nonparametric methods to analyze data when the assumptions for the traditional tests are violated. We will also consider problems in big data and how to work with large data sets. Our focus throughout will be on statistic computing with R and clearly articulating our results.

Intended Learning Outcomes: By the end of this course, students will be able to ...
...clearly state a research question and pick an appropriate statistical method.
...describe the key features of a data set using graphical and numerical methods.
...understand general linear modeling including regression and ANOVA.
...understand how to design and experiment and determine sample size.
...determine when a nonparametric test is appropriate and how use them.
...articulate statistical methods and results to an audience of experts and non-experts.

Content:

- Drawing Statistical Conclusions
- Visualizing Data
- 2-sample inference
- Linear Regression
- ANOVA
- Nonparametric Methods (Wilcoxin Rank Sum, Wilcoxin Signed Rank, Runs Test, Kruskal-Wallis)
- Logistic Regression

Tests: There will be three tests during the semester. They will be on

- Wednesday, February 12
- Wednesday, March 18
- Wednesday, April 15

Technology: We will be using R and its companion integrated development environment Rstudio throughout the semester. Both are free and can be downloaded from the internet. Please see the document “Getting Started with R” on Inquire for complete instructions on getting set up.

Homework: Homework will be assigned daily and graded for both completeness and correctness.

Projects: Throughout the semester we will be completing data driven assignments that you will complete using the statistical software R. Your assignments are to be completed in Rmarkdown and will be graded for correctness, organization, and presentation. You can find the datasets on our course webpage at math.roanoke.edu/childers/STAT220.

Final Exam: The final exam will be cumulative and will be given on Monday, April 27th, 2:00PM -5:00PM.

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

Tests	40%
Homework/Projects	40%
Final Exam	20%

A *tentative* guideline for determination of grade will then be:

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

MCSP Conversation Series: Attending at least two MCSP conversation series events is required. Within one week of the lecture, a one page reflection paper will be due and will count as a quiz grade.

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.

Academic Integrity System: The Roanoke College Academic Integrity System applies to all graded work in this course. Students are responsible for understanding and adhering to the Academic Integrity System. Among other things the Academic Integrity System prohibits giving or receiving unauthorized aid, assistance, or unfair advantage on academic work. Please note that having a phone or unauthorized electronic device out during a test is an academic integrity violation.