STAT 304 - Applied Linear Regression - Fall 2024

Instructor: Dr. Adam Childers / childers@roanoke.edu

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Office Hours: 11:00-12:00 PM Tuesday, Thursday, and by appointment. I'm available to meet at other times; please email me to schedule an appointment.

Meeting Time: 8:30-9:30 AM, Monday, Wednesday, Friday

Meeting Place: Trexler 374

Required Text: *Regression Analysis by Example 6th Edition,* by Chatterjee and Hadi.

Course Objective: The objective is to understand how to create and analyze linear regression models. In our study of applied linear regression, we will become familiar with statistical software and learn how to apply it to problems in regression analysis. We will learn how to communicate our statistical findings to our intended audience while being technically precise.

Intended Learning Outcomes: By the end of this course, students will be able to …
…understand how to select and interpret a statistical model.
…understand the connections between regression analysis and the design of experiments.
…effectively use regression analysis to understand the information contained in a data set.
…understand the role statistical software plays in regression analysis.
…understand the limitations of regression analysis and the assumptions necessary to use it.

Content: We will cover most of chapters 1 through 12 in the text. Included in these chapters is:

- Simple Linear Regression
- Multiple Linear Regression
- Regression Diagnostics
- Using Qualitative Variables as Predictors
- Transformations of Variables
- Weighted Least Squares
- Analysis of Collinear Data
- Variable Selection Procedures
- Lasso and Ridge Regression
- Logistic Regression

Tests: There will be two tests during the semester. They will be on September 25th and October 30th.

Technology: We will use R and its companion integrated development environment RStudio throughout the semester. Both are free and can be downloaded from the internet.

Homework Assignments: Homework assignments will help synthesize the material from class and improve our R programming skills.

Quizzes: We will have short quizzes to prepare for tests and get feedback on our progress.

Projects: We will work on data-driven projects using R throughout the semester. These assignments will be completed in R Markdown and graded for correctness, organization, and presentation. The final project will be completed in groups of 2 or 3 and require you to investigate a topic in regression not covered in class. This project will culminate in a report, an oral presentation, and an activity for the class.

Final Exam: The final exam is on Friday, Dec 13th at 8:30 AM.

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

Tests	30%
Assignments/Projects/Quizzes	30%
Final Project	20%
Final Exam	20%

A *tentative* guideline for the 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: Attendance 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 in your HW grade. You find the upload link on Inquire.

Attendance: Attendance is required and expected. An absence not discussed with me before class is considered unexcused. Regardless of whether the absence is excused, 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 it, we can work together to reschedule the test up to two days after the scheduled date. If that is not possible, within two days, I will replace that test grade with your final exam grade.

Make-up Work: 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. Unexcused work can be turned in up to two days after the due date for a 25% penalty.

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 use R, R Studio, and R Markdown in class and on assignments.

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.