STOR 455.01 – Summer 2024
Methods of Data Analysis

Learning Objectives

This course will enable you to:

- understand the context for linear regression to evaluate models and estimate and predict likely values;

- transform data to deal with problems identified in the regression model;

- perform methods for building multiple regression models;

- include categorical predictors into a regression model;

- distinguish between outliers and influential data points and how to deal with these; and

- become competent using the R and RStudio to construct and evaluate regression models

Course Topics

Basic inference; two-sample comparisons, correlation; simple and multiple regression (including significance tests, diagnostics, variable selection); analysis of variance; and the use of statistical software

Basic Information

Instructor	Andrew Ackerman (Andy) Email: atacker@email.unc.edu Office Hours: W 9-10, F 8-9:30 am Hanes B-07
Instructional Assistants	Fuwei Yu: 9:30 – 10:30 am T Th Hanes B-01 or via zoom Thanh Ho: 9:45-10:45 am M W Hanes B-44
Contacting us	When emailing me, please simply call me Andy, and include "455-01" in the subject line. You may include screenshots or photos of your scratch work.
Course Mode	In-Person unless otherwise advised. In the case of a transition to purely virtual instruction, lectures will continue synchronously via zoom and exam policies will be made explicit.
Canvas link	https://uncch.instructure.com/courses/61082?for_reload=1
Lecture	M-F 1:15 pm – 2:45 pm; Hanes 130
Course materials	The course text is Stat2: Modeling with Regression and ANOVA, Cannon et. al. (Freeman 2019) 2nd edition. I write my own lectures, so this will be more of a reference text than a required course material. Simply put, buying this book will be optional.
Credit hours	3
Prerequisites	Stor 155 or equivalent

Target Audience	Undergraduate students in the STAN major and students throughout the natural and social sciences who are interested in applying regression analysis in their research and/or understanding the statistical concepts underlying the methodology
Office hours	Office hours are your time to ask me anything you want. My sole stipulation is that you should have attempted a homework problem before you ask me about it. My hope is that holding multiple office hours on three different days will accommodate the diversity of schedules inherent to such a class. That said, if you find yourself unable to attend office hours, feel free to email me and set up an appointment.

Final Grade Computation

Assessments	Date	Percent
Homework	1/Week	15%
Quiz	3 Total	10%
Midterm 1	3-July	25%
Midterm 2	16-July	25%
Final Project		25%

A	93 or above
A-	90 to 92.99

B+	87 to 89.99
B	83 to 86.99
B-	80 to 82.99

C+	77 to 79.99
C	73 to 76.99

C-	70 to 72.99
D+	67 to 69.99
D	60 to 66.99
F	Below 60

Course Assessments

Homework	Homework will be assigned on a weekly basis. These assignments are intended to be substantial in length and include both theoretical and computational exercises as practice for the quizzes and exams respectively. You are encouraged to collaborate with your peers, but the finalized assignment should ultimately represent your own work. Any dispute regarding the grading of a homework assignment should be brought to either IA or myself no more than 1 week after the deadline of an assignment.
Quizzes	We will have three quizzes roughly uniformly distributed thoroughly classes. These are my opportunity to evaluate your theoretical understanding with a paper and pencil assessment. As such, they serve as partner to the exams that are entirely coding based, but they comprise significantly less of your overall grade. Quizzes will be closed-book, closed-note completed during class. As with exams, there will be no make-up quizzes save for a university excused absence. Unexcused missed quizzes will result in a zero.
Exams	There will be two midterms. These will be coding based, open-book, open-notes, closed internet completed during class.

	Exams are required and no make-up exams will be granted unless your absence is approved by the university. If you work with any classmate or another student at UNC on your exam, you will receive a 0% and be reported to the university. You cannot have three finals within a 24-hour period, and therefore you will need to be excused from the regularly scheduled final exam. In this scenario, you must obtain a dean's excuse and discuss the situation with me at least two weeks before the regularly scheduled final exam so that an alternative arrangement can be made.
Project	In place of a final exam, you will have a final project due during the final exam time slot. This project is meant to be a comprehensive data analysis using techniques from the class on a data set of your choosing. A more detailed description of the project is given on the canvas page.

Course Policies

Teaching Philosophy	My general approach aims to make two principles abundantly clear: there are no (sincere) bad questions, and education is only one facet of your life. To the first point, if you ask me a question out of genuine curiosity or confusion, I guarantee to respect and attend to it regardless of the level of complexity. Note, I do not claim to always have the answer, and certain questions may require an outside (office hours) conversation. But my guarantee is to provide an answer when I am able and search with you when unable. The flip side of this guarantee is your willingness to keep me accountable. Ask questions. If you are confused, please reach out for help. If in-class questions are too daunting, take advantage of office hours, tutorial sessions, or electronic communication. As to the second point, while I am ultimately a very ardent advocate of the merits of education, I want to reiterate that no single facet of your life – perhaps least of which performance in STOR 455.01 – fully defines you as a person. This is not to say that this, or any class, is unimportant, rather that this class is meant to enable and instruct not to define.
Honor Code	It is my aim to make my expectations for acceptable and original work as clear and explicit as possible. Gray areas frustrated me as a student, so I aim to prevent them as an instructor. To that end, students are bound by UNC's honor code in taking exams and in written work, and the submission of said work signifies understanding and acceptance of those requirements. More specific to this course, collaboration is not only permitted but *encouraged* on homework and homework alone. Exams and quizzes, by contrast, will be completed individually. I recognize that exams can be immensely stressful, and I do not intend to add to that burden. That said, my job is to cultivate and assess your *personal* understanding. Insofar as individual exams serve this purpose, they will be preferred. Please consult with me if you have any questions about the honor code. Asking for clarification in advance is far preferred to asking for forgiveness post-facto.
ChatGPT	ChatGPT (GPT4) and other large language processing models are not permitted resources on open-notes exams, homework, or the project. If there is any evidence that the assignment was completed or aided via submission to such a model, the assignment will result in a zero.

Attendance Policy	Lecture attendance is not required. That said, class participation is fundamental to success in this class.
Mask Requirements	In accordance with the UNC mask policy, masks are optional for all students and instructors.
Technology Use	You are welcome to bring a calculator to class. We will also use Excel on your laptops frequently. Technology can support student learning, but it can also become a distraction. You should not use laptops or other devices for entertainment during class and should not display any material on the laptop which may be distracting or offensive to your fellow students. Laptops should only be used for legitimate classroom purposes, such as coding, taking notes, or downloading class information from Sakai. E-mail, messaging, surfing the Internet, reading the news, or playing games are not considered legitimate classroom purposes. Such inappropriate laptop use is distracting to those seated around you and is unprofessional.
Syllabus changes	I reserve the right to make changes to the syllabus, including test dates and grade computation. These changes will be announced as early as possible so that students can adjust their schedules.

University Resources for Students

Learning Center	The UNC Learning Center is a great resource both for students who are struggling in their courses and for those who want to be proactive and develop sound study practices to prevent falling behind. They offer individual consultations, peer tutoring, academic coaching, test prep programming, study skills workshops, and peer study groups.
Accessibility Resources	UNC-Chapel Hill facilitates the implementation of reasonable accommodations for students with learning disabilities, physical disabilities, mental health struggles, chronic medical conditions, temporary disability, or pregnancy complications, all of which can impair student success. See the ARS website for contact and registration information: https://ars.unc.edu/about-ars/contact-us
Counseling and Psychological Services	CAPS is strongly committed to addressing the mental health needs of a diverse student body through timely access to consultation and connection to clinically appropriate services, whether for short or long-term needs. Go to their website: https://caps.unc.edu/ or visit their facilities on the third floor of the Campus Health Services building for a walk-in evaluation to learn more.
Title IX	Any student who is impacted by discrimination, harassment, interpersonal (relationship) violence, sexual violence, sexual exploitation, or stalking is encouraged to seek resources on campus or in the community. Please contact the Director of Title IX Compliance (Adrienne Allison - Adrienne.allison@unc.edu), Report and Response Coordinators in the Equal Opportunity and Compliance Office (reportandresponse@unc.edu), Counseling and Psychological Services (confidential), or the Gender Violence Services Coordinators (gvsc@unc.edu; confidential) to discuss your specific needs. Additional resources are available at safe.unc.edu.

Ombuds Office	The Ombuds Office (https://ombuds.unc.edu/) is an impartial, confidential, and independent office within UNC that offers a safe space to any UNC members to discuss sensitive issues (for example, issues relating to power dynamic). They do not take sides and maintain complete confidentiality. All conversations with the Ombuds Office are "off the record."
Andy's Teaching Mentors	As a graduate Teaching Fellow, I am mentored by STOR professors Dr. Mario Giacomazzo (mgiacoma@email.unc.edu) and Dr. Jeff McLean (mclean@unc.edu). If you have an issue with the class that you feel uncomfortable raising with me, you may raise it with them confidentially. The Ombuds Office (above) is also an option.

Rough Course Outline (updated 6/1/23)

Class	Day	Date	Topics	Assignment Due	Classes (Topics) *Emphasized*[1] in Assignment Due
1	M	24-June	Introduction/Basic Modeling		
2	T	25-June	Simple Linear Regression		
3	W	26-June	SLR/Transformations		
4	Th	27-June	Transformations, Influential Points		
5	F	28-June	Inference for SLR		
6	M	1-July	ANOVA	HW1	1-5
7	T	2-July	Review (Quiz 1/Exam1), Quiz 1	Quiz 1	1-6
8	W	3-July	Exam 1	Exam 1	1-6
		4-July	*No Class—Independence Day*		
9	F	5-July	Multiple Regression		
10	M	8-July	Multiple Regression/Model Selection	HW 2	6,9
11	T	9-July	Model Selection		
12	W	10-July	Coding Categorical Predictors		
13	Th	11-July	Higher Order Models		
14	F	12-July	Cross Validation	HW 3	9-13
15	M	15-July	Review (Quiz2/Exam 2), Quiz 2	Quiz 2	6, 9-14
16	T	16-July	Exam 2	Exam 2	6, 9-14
17	W	17-July	Logistic Regression		

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[1] All assignments are by nature cumulative, but each will focus on the subjects indicated in this column.

18	Th	18-July	Logistic Regression		
19	F	19-July	Diagnostics for Logistic Regression	HW 4	14, 17-18
20	M	22-July	Multiple Logistic Regression		
21	T	23-July	One-way ANOVA		
22	W	24-July	Review (Quiz 3/Final Project), Quiz 3	Quiz 3	17-21
23	Th	25-July	Data Ethics/Project Advising	HW 5	19-21
			FINAL PROJECT		