STA 210: Regression Analysis

Learn approaches for analyzing multivariate data sets, emphasizing analysis of variance, linear regression, and logistic regression. Learn techniques for checking the appropriateness of proposed models, such as residual analyses and case influence diagnostics, and techniques for selecting models. Gain experience dealing with the challenges that arise in practice through assignments that utilize real-world data. This class emphasizes data analysis over mathematical theory.

Course info

Lectures

🏛 Gross Hall 103   📅 Mon and Wed 3:05p - 4:20p

Labs

Lab 01   🏛 Soc Psych 127   📅 Thu 3:05p - 4:20p

Lab 02   🏛 Soc Sci 119   📅 Thu 4:40p - 5:55p

Teaching team and office hours

Instructor	Prof. Maria Tackett (http://stat.duke.edu/~mt324/)	✉ (mailto:maria.tackett@duke.edu) 🐙 (https://github.com/matackett)	Tue 3p - 4:30p	Old Chem 118B
TAs	Cody Coombs	✉ (mailto:cody.coombs@duke.edu) 🐙 (https://github.com/coombscody)	Tue 1p - 3p	Old Chem 203B
	Matty Pahren (https://www.linkedin.com/in/mattypahren)	✉ (mailto:martha.pahren@duke.edu) 🐙 (https://github.com/mpahren)	Tue 10a - 12p	Old Chem 203B
	Ethan Shen (https://www.linkedin.com/in/ethan-shen-931010134/)	✉ (mailto:ethan.shen@duke.edu) 🐙 (https://github.com/ethann-shen)	Thu 6p - 8p	Old Chem 203B
	Steven Winter (https://www.linkedin.com/in/steven-winter-3810a0109)	✉ (mailto:steven.winter@duke.edu) 🐙 (https://github.com/szwinter)	Wed 12p - 2p	Old Chem 203B
	Tong Wu	✉ (mailto:shitong.wu@duke.edu) 🐙 (https://github.com/TongWu352)	Fri 11:30a - 1:30p	Old Chem 203B
	Evan Wyse (https://www.linkedin.com/in/evan-wyse-85305426/)	✉ (mailto:evan.wyse@duke.edu) 🐙 (https://github.com/wyseguy7)	Mon 12:30p - 2:30p	Old Chem 203B

Textbooks

Handbook of Regression Analsyis (http://sakai.duke.edu)	James, Witten, Hastie, Tibshirani	Springer, 1st edition, 2013	Freely available on Sakai
R for Data Science (http://r4ds.had.co.nz/)	Chatterjee, Simonoff	Wiley, 1st edition, 2013	Freely available online

Materials

You should bring a fully-charged laptop or comparable device to every lecture and lab session.

DUKE STATSCI (HTTP://STAT.DUKE.EDU/)   RSTUDIO (HTTPS://RSTUDIO.CLOUD/)

GITHUB (HTTPS://GITHUB.COM/STA210-FA19)   (./)

Policies

■■ (policies.pdf) Click the icon to download a PDF copy of the course policies.

Course Learning Objectives

By the end of the semester, you will…

- know methods for analyzing multivariate datasets and understand how these methods are applied in research
- know how to check whether proposed statistical models are appropriate for given data
- develop proficiency in addressing complex research questions using statistical evidence
- develop proficiency in computing tools used to conduct reproducible statistical analyses, specifically R and Git
- understand the process of data-based research by working on an independent research project

Activities & Assessments

The following activities and assessments will help you successfully achieve the course learning objectives. By experiencing the course content in different ways, you will not only gain a better understanding of regression analysis, but you will also get experiences that can guide you as you apply what you've learned in future academic and professional projects.

Homework (25%)

In homework, you will apply what you've learned during lecture and lab to complete data analysis tasks. You may discuss homework assignments with other students; however, homework should be completed and submitted individually. Homework must be typed up using R Markdown and submitted in the appropriate GitHub repository.

The lowest homework grade will be dropped at the end of the semester.

Labs (15%)

In labs, you will apply the concepts discussed in lecture to various data analysis scenarios, with a focus on the computation. You will work on lab assignments in teams, and all team members are expected to contribute equally to the completion of each assignment. You are expected to use the team's repository on the course's GitHub page as the central platform for collaboration. Commits to this repository will be used as a metric of each team member's relative contribution for each lab. You will also be asked to evaluate your team members' performance periodically during the semester.

The lowest lab grade will be dropped at the end of the semester.

Exams (Exam I: 20%, Exam II: 20%)

The exams are an opportunity to assess the knowledge and skills you've learned. They will include both the conceptual and mathematical and conceptual aspects of regression. Both exams will be given during a lecture class period, and you will be permitted to bring one page of hand-written notes to each exam.

Final Project (15%)

The purpose of the project is to apply what you've learned throughout the semester to analyze an interesting data-based research question using regression. The project will be completed in teams, and each team will present their results during the final exam period, Wednesday, December 11, 9a - 12p. **You must complete the final project and present your work during the final exam period to pass the course.**

Teamwork & Engagement (5%)

This part of the final grade will consist of two components. The first component will be based on peer feedback surveys from your teammates. These teams will be constructed based on a short survey used to gauge your previous experience in programming and statistical topics. After completing the survey, you will be assigned to diverse teams of 3-4 students; these teams will stay consistent throughout the semester (barring extraordinary circumstances). You will work in these teams during class, on lab assignments, and on the final project.

The second component will be based on completion of at least 80% of the class engagement surveys given throughout the semester. These quick surveys will consist of about three questions about engagement in the day's lecture. You will receive these surveys via email or text; you will have

an opportunity to indicate your preference at the beginning of the semester.

Grade Calculation

The final grade will be calculated as follows:

Homework	25%
Labs	15%
Exam I	20%
Exam II	20%
Final Project	15%
Teamwork & Engagement	5%

Class attendance in lecture and lab is a firm expectation; frequent absences or tardiness will be considered a legitimate cause for grade reduction.

If you have a cumulative numerical average of 90 - 100, you are guaranteed at least an A-, 80 - 89 at least a B-, and 70 - 79 at least a C-. The exact ranges for letter grades will be determined after Exam 2.

Inclusion

In this course, we will strive to create a learning environment that is welcoming to all students and that is in alignment with Duke's Commitment to Diversity and Inclusion (https://provost.duke.edu/initiatives/commitment-to-diversity-and-inclusion). If there is any aspect of the class that is not welcoming or accessible to you, please let me know immediately. Additionally, if you are experiencing something outside of class that is affecting your performance in the course, please feel free to talk with me and/or your academic dean.

Accessibility

Duke University is committed to providing equal access to students with documented disabilities. Students with disabilities may contact the Student Disability Access Office (SDAO) (https://access.duke.edu) to ensure your access to this course and to the program. There you can engage in a confidential conversation about the process for requesting reasonable accommodations both in the classroom and in clinical settings. Students are encouraged to register with the SDAO as soon as they begin the program. Please note that accommodations are not provided retroactively. More information can be found online at access.duke.edu (https://access.duke.edu) or by contacting SDAO at 919-668-1267, SDAO@duke.edu (mailto:sdao@duke.edu).

Where to find help

- If you have a question during lecture or lab, feel free to ask it! There are likely other students with the same question, so by asking you will create a learning opportunity for everyone.
- The teaching team is here to help you be successful in the course. You are encouraged to attend any of the office hours posted on the home page to ask questions as your study the course content and work through assignments. A lot of questions are most effectively answered in-person, so office hours are a valuable resource. Please use them!
- Outside of class and office hours, any general questions about course content or assignments should be posted on Piazza since there are likely other students with the same questions. The questions you post will be visible to the entire class, so please email Professor Tackett directly with any specific questions about grades or personal matters.

Sometimes you may need help with the class that is beyond what can be provided by the teaching team. In that instance, I encourage you to visit the Academic Resource Center.

The Academic Resource Center (ARC) (https://arc.duke.edu) offers free services to all students during their undergraduate careers at Duke. Services include Learning Consultations, Peer Tutoring and Study Groups, ADHD/LD Coaching, Outreach Workshops, and more. Because learning is a process unique to every individual, they work with each student to discover and develop their own academic strategy for success at Duke. Contact the ARC to schedule an appointment. Undergraduates in any year, studying any discipline can benefit! Contact ARC@duke.edu (mailto:arc@duke.edu), 919-684-5917, 211 Academic Advising Center Building, East Campus – behind Marketplace.

Where to find course materials

All assignments and course materials may be found on Sakai and the course website, http://bit.ly/sta210-fa19 (http://bit.ly/sta210-fa19). There is an up-to-date course schedule on the course website where you can find lecture notes, assignment instructions, and reading assignments.

Announcements will be sent via email, so please check your email regularly. Announcements may also be found on Sakai.

Make-up Policy

Students who miss a class due to a scheduled varsity trip, religious holiday, or short-term illness should fill out an online NOVAP (https://trinity.duke.edu/undergraduate/academic-policies/athletic-varsity-participation), Religious Observance Notification (https://trinity.duke.edu/undergraduate/academic-policies/religious-holidays), or Incapacitation Form (https://trinity.duke.edu/undergraduate/academic-policies/illness), respectively. These excused absences do not excuse you from assigned homework. It will still be your responsibility to submit relevant assignments in accordance with the deadline.

If you have a personal or family emergency or health condition that affects your ability to participate in class, you should contact your academic dean's office. More information about this procedure may be found on the Personal Emergencies page (https://trinity.duke.edu/undergraduate/academic-policies/personal-emergencies) or provided by your academic dean.

Exam dates cannot be changed and no make-up exams will be given. If you must miss an exam, your absence must be officially excused before the exam due date. If your absence is excused, the missing exam grade will be imputed at the end of the semester based on your performance on other relevant course assignments.

The final project presentations will be during the university scheduled exam period, Wednesday, December 11, 9a - 12p. **You must complete the final project and present your work during the exam period in order to pass the course.**

Late Work

Homework or lab assignments submitted late but within 24 hours of the deadline may be accepted with a 20% penalty. Homework or lab assignments submitted any later will not be accepted.

Late work will not be accepted for the exams or the final project.

Academic Honesty

By enrolling in this course, you have agreed to abide by and uphold the provisions of the Duke Community Standard (https://studentaffairs.duke.edu/conduct/about-us/duke-community-standard) as well as the policies specific to this course. Any violations will automatically result in a grade of 0 on the assignment and will be reported to Office of Student Conduct (https://studentaffairs.duke.edu/conduct) for further action.

- You may not discuss or otherwise work with others on the exams. Unauthorized collaboration or using unauthorized materials will be considered a violation for all students involved. More details will be given closer to the exam date.
- **Reusing code**: Unless explicitly stated otherwise, you may make use of online resources (e.g. StackOverflow) for coding examples on assignments. If you directly use code from an outside source (or use it as inspiration), you must explicitly cite where you obtained the code. Any recycled code that is discovered and is not explicitly cited will be treated as plagiarism.
- On individual assignments, you may not directly share code or write up with other students. On team assignments, you may not directly share code or write up with another team. Unauthorized sharing of the code or write up will be considered a violation for all students involved.

Regrade Requests

Regrade requests should be submitted through the regrade request from on Gradescope. **Requests for a regrade must be made within a week of when the assignment is returned.** Due to the time consuming nature of regrades, requests submitted later will not be regraded. Requests will be honored if there is an error in the grade calculation or a correct answer was mistakenly marked as incorrect. Please note that by submitting a regrade request, your entire assignment may be regraded and you may potentially lose points. Therefore, you should attend office hours to ask a member of the teaching team about your grading feedback before submitting a regrade request.

No grades will be changed after the final project presentations.

Note: Grades can only be changed by the Professor Tackett. Teaching Assistants cannot change grades on returned assignments.

Technology

Cell phones and other electronic devices should be turned off or put on silent during class. When you use a laptop, tablet, or comparable device, you should ensure that the volume set to mute and the device is only used for class purposes. In general, you should focus on the class discussion/activity at hand and refrain from engaging in other work or outside activities.

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