STA 101: Data Analysis and Statistical Inference

Summer 2019 Syllabus

Course Goals and Objectives

This course introduces students to the discipline of statistics as a science of understanding and analyzing data. Throughout the semester, students will learn how to effectively make use of data in the face of uncertainty: how to collect data, how to analyze data, and how to use data to make inferences and conclusions about real world phenomena.

The course goals are as follows:

1. Recognize the importance of data collection identify limitations in data collection methods, and determine how they affect the scope of inference.
2. Use statistical software to summarize data numerically and visually, and to perform data analysis.
3. Have a conceptual understanding of the unified nature of statistical inference.
4. Apply estimation and testing methods to analyze single variables or the relationship between two variables in order to understand natural phenomena and make data-based decisions.
5. Model numerical response variables using a single or multiple explanatory variables.
6. Interpret results correctly, effectively, and in context without relying on statistical jargon.
7. Critique data-based claims and evaluate data-based decisions.
8. Complete a research project demonstrating mastery of statistical data analysis from exploratory analysis to inference to modeling.

Course Meeting Times and Location

Course Dates: 7/01/19 - 8/08/19 (no class on 7/04).
Midterm (tentative): 7/19/29, in class
Final exam: 8/10/19 from 9:00AM-12:00PM in Perkins LINK 071 (Classroom 5).

	Day	Time	Location
Lecture	MTWThF	11:00AM-12:15PM	Perkins LINK 071 (Classroom 5)
Lab	MTh	12:30PM-1:45PM	Perkins LINK 071 (Classroom 5)
Office Hours (Becky)	T	1:00PM-2:00PM	Old Chemistry 203B
	F	9:30AM-10:30AM	Old Chemistry 203B
Office Hours (Federico)	W	5:00PM-7:00PM	Old Chemistry 203B

Instructor Contact Information

Instructors	Email	Phone Number
Becky Tang	becky.tang@duke.edu	614.949.5477
Federico Ferrari	federico.ferrari@duke.edu	

Required Materials

Textbook: OpenIntro Statistics (http://openintro.org/os) - Diez, Barr, Cetinkaya-Rundel CreateSpace, 4th Edition, 2019 (ISBN: 978-1943450077) The textbook is freely available online (https://www.openintro.org/stat/os4.php). You're welcomed to read on screen or print it out. If you prefer a paperback version you can buy it at the cost of printing (around $20) on Amazon or at the on-campus bookstore.

Tips for Success

- Complete the reading before a new unit begins, and then review again after the unit is over.
- Be an active participant during lectures and labs.
- Ask questions - during class or office hours, or by email or Piazza. Ask me, your TAs, and your classmates.
- Do the problem sets - start early and make sure you attempt and understand all questions.
- Give yourself plenty of time time to prepare a good cheat sheet for exams. This requires going through the material and taking the time to review the concepts that you're not comfortable with.

Grading

Grades may be curved at the end of the semester. Cumulative numerical averages of 90 - 100 are guaranteed at least an A-, 80 - 89 at least a B-, and 70 - 79 at least a C-, however the exact ranges for letter grades will be determined after the final exam. The more evidence there is that the class has mastered the material, the more generous the curve will be.

Component	Contribution
Problem Sets	20%
Lab Assignments	15%
Participation	10%
Midterm	20%
Project	10%
Final	25%

Regrade requests must be made within one week of when the assignment is returned, and must be submitted via Gradescope along with an e-mail notifying the instructor of the regrade request. These will be honored if points were tallied incorrectly, or if you feel your answer is correct but it was marked wrong. No regrade will be made to alter the number of points deducted for a mistake. There will be no grade changes after the final exam.

Problem Sets

These will be assigned (approximately) twice a week on the course webpage and will be comprised of problems from the textbook. The objective of the problem sets is to help you develop a more in-depth understanding of the material and help you prepare for exams and the project. Grading will be based on completeness as well as accuracy. In order to receive credit you must show all your work.

You are welcomed, and encouraged, to work with each other on the problems, but you must turn in your own work. If you copy someone else's work, both parties will receive a 0 for the problem set grade as well as being reported to the Office of Student Conduct. Work will be checked for instances of plagiarism prior to being graded.

Submission Instructions: Problem sets are to be turned in on Gradescope. We strongly recommend working in a word processor of your choice (Word, Google Docs, etc.), saving your work as PDF, and submitting the PDF. You are also welcomed to hand-write your solutions and scan your homework to create a PDF, but we recommend you use high-quality scanners (ex. scanners in the library) for the best resolution. If your scanned PDF file is too low of a resolution, you will receive a 0 on the problem set.

Labs

The objective of the labs is to give you hands on experience with data analysis using modern statistical software. The labs will also provide you with tools that you will need to complete the project successfully. We will use a statistical analysis package called RStudio, which is a front end for the R statistical language. You will start working on the lab during the class session, but note that the labs are often designed to take more than just the class time, so you will finish the lab before the due date (which will be the following lab session).

Submission Instructions: Lab reports (PDF files) are to be turned in on Gradescope.

Participation

We will have in class application exercises and demonstrations, and it is your responsibility to actively engage with the class during these activities. Additionally, practice problems will be assigned on a regular basis. While the problems themselves are ungraded, students may be asked to share their solutions with the class.

Students with Disabilities

Students with disabilities who believe they may need accommodations in this class are encouraged to contact the Student Disability Access Office (http://www.access.duke.edu/students/requesting/index.php) at (919) 668-1267 as soon as possible to better ensure that such accommodations can be made.

Academic Integrity

Duke University is a community dedicated to scholarship, leadership, and service and to the principles of honesty, fairness, respect, and accountability. Citizens of this community commit to reflect upon and uphold these principles in all academic and non-academic endeavors, and to protect and promote a culture of integrity. Cheating on exams and quizzes, plagiarism on homework assignments and project, lying about an illness or absence and other forms of academic dishonesty are a breach of trust with classmates and faculty, violate the Duke Community Standard (https://studentaffairs.duke.edu/conduct/about-us/dukecommunity-standard), and will not be tolerated. Such incidences will result in a 0 grade for all parties involved as well as being reported to the Office of Student Conduct (http://www.studentaffairs.duke.edu/conduct). Additionally, there may be penalties to your final class grade. Please review the Duke's Academic Dishonesty policies (https://studentaffairs.duke.edu/conduct/z-policies/academic-dishonesty).

Excused Absences

Students who miss graded work due to a scheduled varsity trip, religious holiday or short-term illness should fill out an online NOVAP (https://trinity.duke.edu/undergraduate/academicpolicies/athletic-varsity-participation), religious observance notification (https://trinity.duke.edu/undergraduate/academic-policies/religious-holidays), or short-term illness notification (http://trinity.duke.edu/ academic-requirements?p=policy-short-termillness-notification) form respectively.

If you cannot complete an assignment on the due date due to a short-term illness, you have until noon the following day to complete it at no penalty. Then the regular late work policy will kick in. However, you must notify me prior to the original due date.

If you are faced with a personal or family emergency or a long-range or chronic health condition that interferes with your ability to attend or complete classes, you should contact your academic dean's office. See more information on policies surrounding these conditions here: (https://trinity.duke.edu/undergraduate/ academic-policies/personal-emergencies). Your academic dean can also provide more information.