Data Analysis and Statistical Inference
Introduction

Sta 104 - Summer 2018, Term 1

Duke University, Department of Statistical Science

 Slides posted at *https://www2.stat.duke.edu/courses/Summer18/sta104.001-1/*

Teaching team

- Professor: Prof. Zach White - *zachary.m.white@duke.edu*

Required materials

- OpenIntro Statistics, 3rd Edition: *http://openintro.org/os*
- (optional) Calculator (just something that can do square roots)

Webpage

https://www2.stat.duke.edu/courses/Summer18/sta104.001-1/

Learning units and course outline

- Pictures and summaries of data
  - *Unit 1 - Intro to data:* Observational studies & non-causal inference, principles of experimental design & causal inference, exploratory data analysis, introduction to simulation-based statistical inference.
- Mathematics behind statistics
  - *Unit 2 - Probability & distributions:* Basics of probability and chance processes, Bayesian perspective in statistical inference, the normal and binomial distributions.
- Statistical inference
  - *Unit 3 - Framework for inference:* CLT, sampling distributions, and introduction to theoretical inference.
  - Midterm 1
  - *Unit 4 - Statistical inference for numerical variables*
  - *Unit 5 - Statistical inference for categorical variables*
  - Midterm 2
- Modeling
  - *Unit 6 - Simple linear regression:* Bivariate correlation and causality, introduction to modeling.
  - *Unit 7 - Multiple linear regression:* More advanced modeling with multiple predictors.
  - Final Exam

Course structure

- Set of learning objectives and required and suggested readings, videos, etc. for each unit.
- Prior to beginning the unit, watch the videos and/or complete the readings and familiarize yourselves with the learning objectives.
- Begin a new unit with a readiness assessment: individual, then team.
- Class time: split between lecture, discussion/application, and lab.
- Complement your learning with problem sets.
- Wrap up a unit with a performance assessment.

Teams

- Highly functional teams of learners based on survey and pre-test.
- Team members first point of contact.
- Application exercises, labs, team readiness assessments, project.
- Study together, but anything that is not explicitly a team assignment must be your own work.
- Peer evaluations to ensure that all team members contribute to the success of the group and to address any potential issues early on.
  - If you feel that there are issues within your team, you are encouraged to discuss it with your team members and to bring it to my or your TA's attention ASAP (don't wait till things get worse).

Clickers

Objective: Two-way communication and instant feedback.

- Readiness assessments (graded for accuracy)
- Questions throughout lecture (graded for participation)

Project

Objective: Give you independent applied research experience using real data and statistical methods.

- Proposal: due mid-semester
- Poster session: last lab of semester
- Complete in teams, along with peer evaluations to track contribution of each member
- Must complete the project and score at least 30% of the points on each project in order to pass this class

Exams

Midterm 1	May 30, Thurs.
Midterm 2	June 14, Thurs.
Final	TBD

- Exam dates cannot be changed, no make-up exams will be given
- If you cannot take the exams on these dates you should drop this class
- Calculator + cheat sheet allowed

Email & Piazza

- I will regularly send announcements by email, so make sure to check your email daily.
- All content related (non-personal) questions should be posted on Piazza.
- Before posting a new question please make sure to check if your question has already been answered, and answer others' questions.
- Use informative titles for your posts.
- It is more efficient to answer most statistical questions "in person" so make use of OH.

Office Hours

Prof:

- Office hours: TBD

Students with disabilities

Students with disabilities who believe they may need accommodations in this class are encouraged to contact the Student Disability Access Office at (919) 668-1267 as soon as possible to better ensure that such accommodations can be made.

http://www.access.duke.edu/students/requesting/index.php

Academic Dishonesty

Any form of academic dishonesty will result in an immediate 0 on the given assignment and will be reported to the Office of Student Conduct. Additional penalties may also be assessed if deemed appropriate. If you have any questions about whether something is or is not allowed, ask me beforehand.
Some examples:

- Use of disallowed materials (including any form of communication with classmates or accessing the web) during exams and readiness assessments
- Plagiarism of any kind
- Use of outside answer keys or solution manuals for the homework

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. Ask me, your TAs, and your classmates.
- Do the problem sets - start early and make sure you attempt and understand all questions.
- Take each PA and complete practice quizzes (on Coursera) for each unit, and review the feedback for questions you miss.
- Start your project early and and allow adequate time to complete them.
- 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.
- Do not procrastinate - don't let a unit go by with unanswered questions as it will just make the following unit's material even more difficult to follow.

To do

- Download or purchase the textbook
  - Download: *http://openintro.org/os*
- Read the syllabus and let me know if you have any questions
- Watch/Read/Review the resources for Unit 1

Syllabus quiz (10 minutes).
You can refer to the syllabus at
https://www2.stat.duke.edu/courses/Summer18/sta104.001-1/.