Statistics 431: Statistical Inference

Classes: Section 001, Tue/Thu 10:15–11:45 a.m.
                      Section 002, Tue/Thu 12:00–1:30 p.m.

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Course Overview

The course aims to equip the students with ideas and tools in statistics which range from the very beginning of the subject to an intermediate level. Together, we will examine a collection of basic concepts and commonly used methods, with an emphasis on the understanding of when and how to apply them, and why. Students will also experiment the ideas on data examples using the statistical software R.

Topics include (1) collection, summary and display of data, (2) estimation, hypothesis testing, and confidence statements, and (3) simple and multiple linear regression. If time permits, we will also discuss likelihood based inference and/or other advanced topics.

Prerequisites

The official prerequisite of the course is STAT 430. The effective prerequisite is *fluency* with basic probabilistic reasoning and analysis (e.g., probability distributions and densities; joint distributions; conditional probability, independence, correlation, and covariance; moment generating functions; law of large numbers; central limit theorem; etc.)

It would be helpful to have previous exposure to linear algebra, but it is *not required*. Previous exposure to the statistical computing software R is *not required*, either.

Textbook
Statistics and Data Analysis: from Elementary to Intermediate, by A. C. Tamhane and D. D. Dunlop, Prentice Hall, 2000.
A few copies of the textbook is on reserve at the Lippincott Library.

Course Website

The course website uses the **Canvas** platform. Please check the course website for announcements, handouts, sample codes, assignments, solutions, and other materials, etc.

Statistical Computing Software

The statistical computing software R (version 4.0.1 or higher) will be used in the course. It is free, and can be downloaded at the R-project website:

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www.r-project.org.

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The above website also contains a list of manuals for using the software. RStudio (available at www.rstudio.com) can be a helpful IDE for R, the basic version of which is also free. Basic usage of R will be illustrated in class and through sample codes posted on the course website, and *no previous exposure to the software is required.*

Homework Assignments

- There will be five assignments in total. Each assignment will be graded, and the *lowest score will not be counted toward your final grade.*
- Homework assignments will be posted on the course website. After the due dates, solutions will be posted.
- *No late homework will be accepted. No exception will be made.*
- Students can help each other on solving the problems, but are expected to prepare the final writeup individually with acknowledgment of the help received.

Exams

- Midterm exam: Thursday, October 7, in class.
  If you cannot make the midterm exam, please drop the class.
- Final exam: TBA.
- Both exams will be open-book.

Grading Policy

- Homework assignments: 25% (with the lowest score dropped);
- Midterm exam: 35%;
- Final exam: 40%.