Fundamentals of Data Visualization
21-219-220 (3 Credits)

Course Description

This course introduces undergraduate students to Data Visualization by teaching students how to create meaningful charts and figures that are simultaneously informative and pleasing to the eye. The course is divided into three general themes: 1) Programming in R, 2) Research Methods and Statistics, and 3) Generating Meaningful Graphics and Insightful Annotations.

Learning Objectives

This course approaches data visualization through theory and practical programming approaches. A picture may be worth a 1000 words, but these words may mean little without proper understanding of data types, statistical analyses, programming, formatting techniques and writing. By the end of this course, students should be able to know how to write code in R. Students will also know the mathematical foundation of statistics and implement them accurately in R. Finally, students will be able to develop code that can transform various data sets into meaningful figures and adequately annotate figures to convey their meaning to a general audience

Pre-Requisites

Students must have completed 21:219:105 (Everyday Data) **OR** 21:640:125 (Calculus 1). See the department website.

Course Materials

R: R is a free software environment for statistics and graphics. You can install R by going to https://www.r-project.org/. By default, R scripts run through terminal (OSX and Linux) / Command Promtp (Windows). If you prefer a more interactive environment, you can download RStudio from the following https://www.rstudio.com/.

Textbook: Title: Data Visualization with R. (Thomas Rahlf): Textbook web link.

Computer: You will need access to a computer during class time as the course has a heavy emphasis on programming.

Topics Covered and Book Chapters

- Data Types - Chapter 1
- R Bootcamp - Chapter 3
- Perception and Visualization - Chapter 2
- Charts for categorical data - Chapter 6
- Distributions - Chapter 7
- Time Series - Chapter 8
- Scatter Plots - Chapter 9
- Maps - Chapter 10

Department of Mathematics and Computer Science, Smith Hall, 216 Warren Street,Newark,New Jersey, 07102, Phone: (973) 353-1004