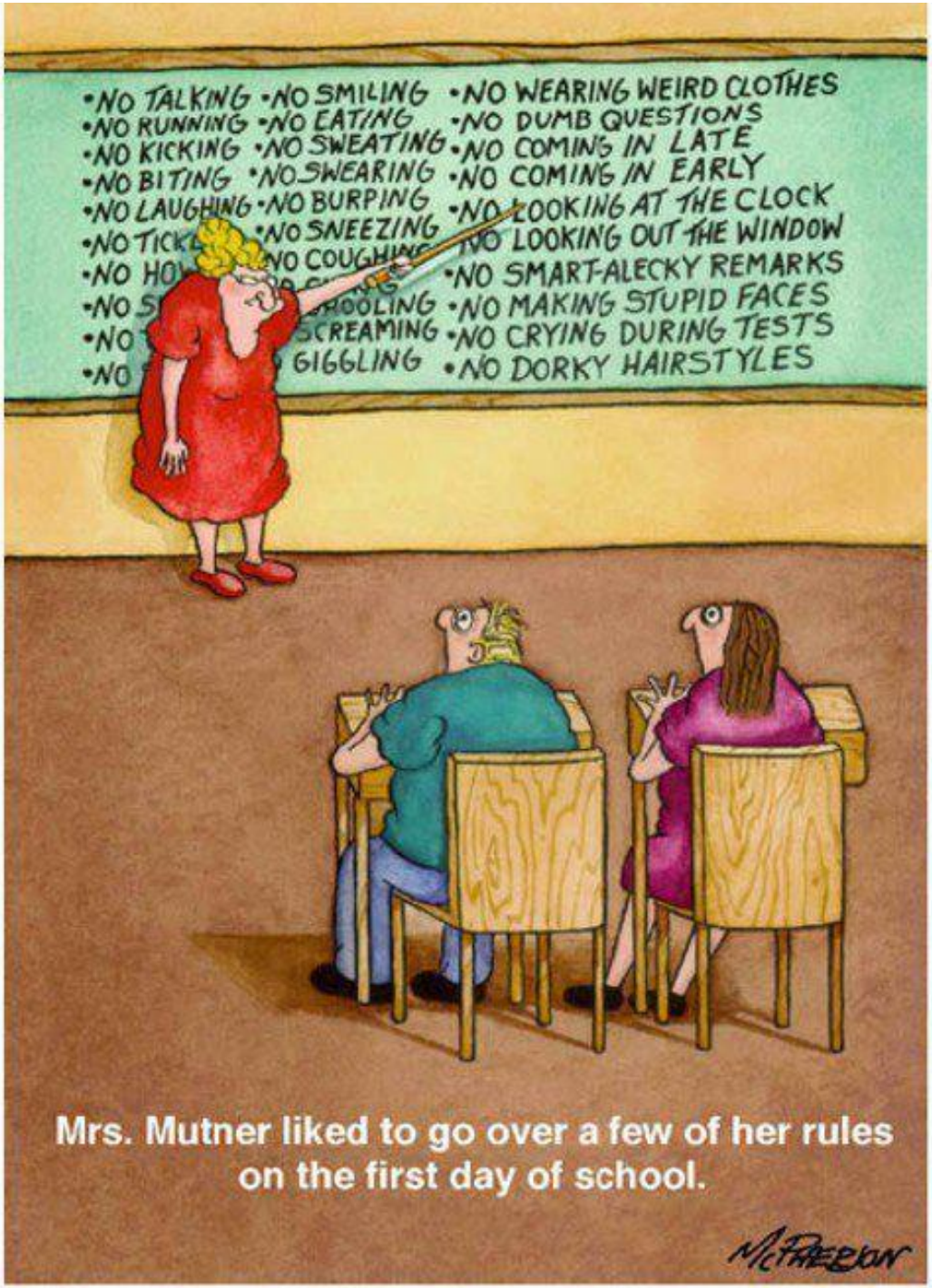
Stat 133: Concepts in Computing with Data

Stat 133 with Gaston Sanchez

Intro survey (google form)


•NO TALKING •NO SMILING •NO WEARING WEIRD CLOTHES
•NO RUNNING •NO EATING •NO DUMB QUESTIONS
•NO KICKING •NO SWEATING •NO COMING IN LATE
•NO BITING •NO SWEARING •NO COMING IN EARLY
•NO LAUGHING •NO BURPING •NO LOOKING AT THE CLOCK
•NO SNEEZING •NO LOOKING OUT THE WINDOW
•NO SMART-ALECKY REMARKS
•NO MAKING STUPID FACES
•NO CRYING DURING TESTS
•NO DORKY HAIRSTYLES
Mrs. Mutner liked to go over a few of her rules on the first day of school.
MCPHERSON

About Stat 133

Stat 133

Core Course for Statistics Major

Stats Major

Prereqs

- Calculus
- Calculus II
- Multivariable Calculus
- Linear Algebra

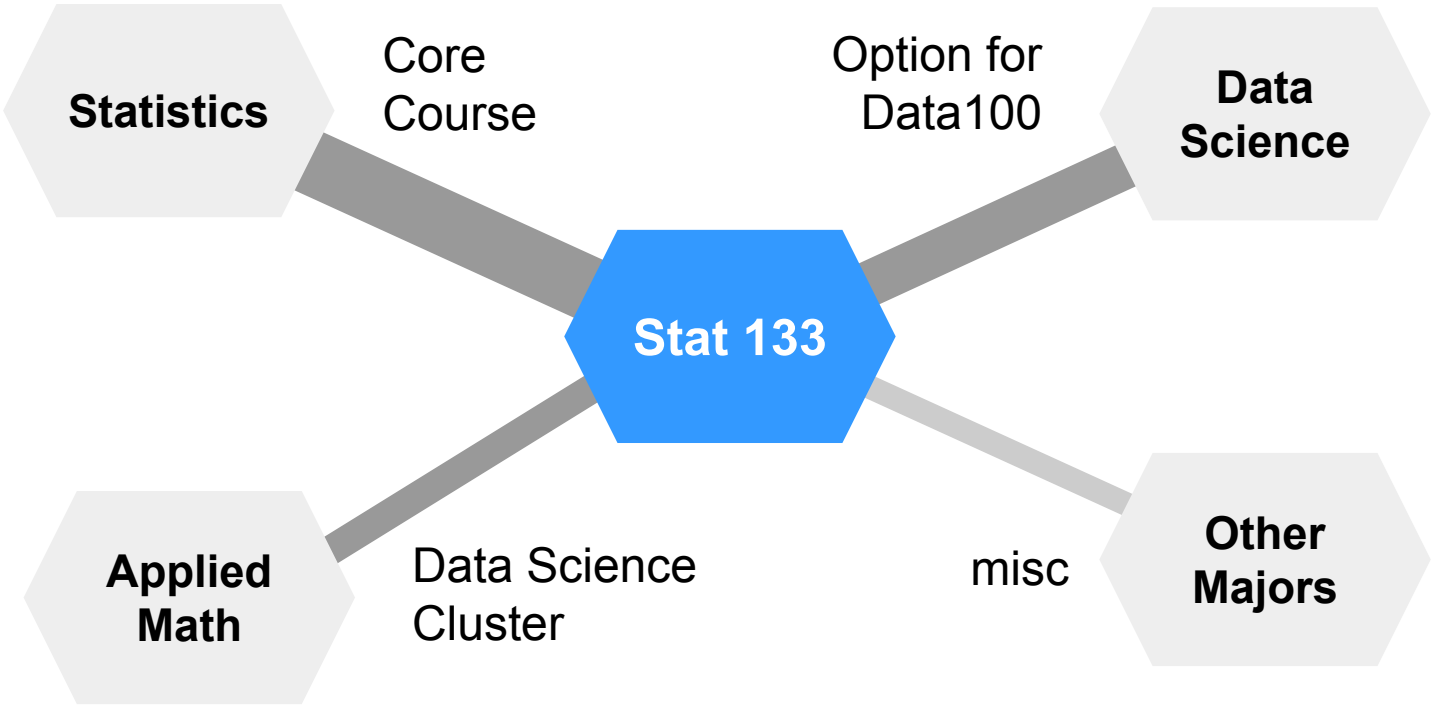
Core

- **Stat 133 Computing**
- Stat 134 Probability
- Stat 135 Statistics

Elective

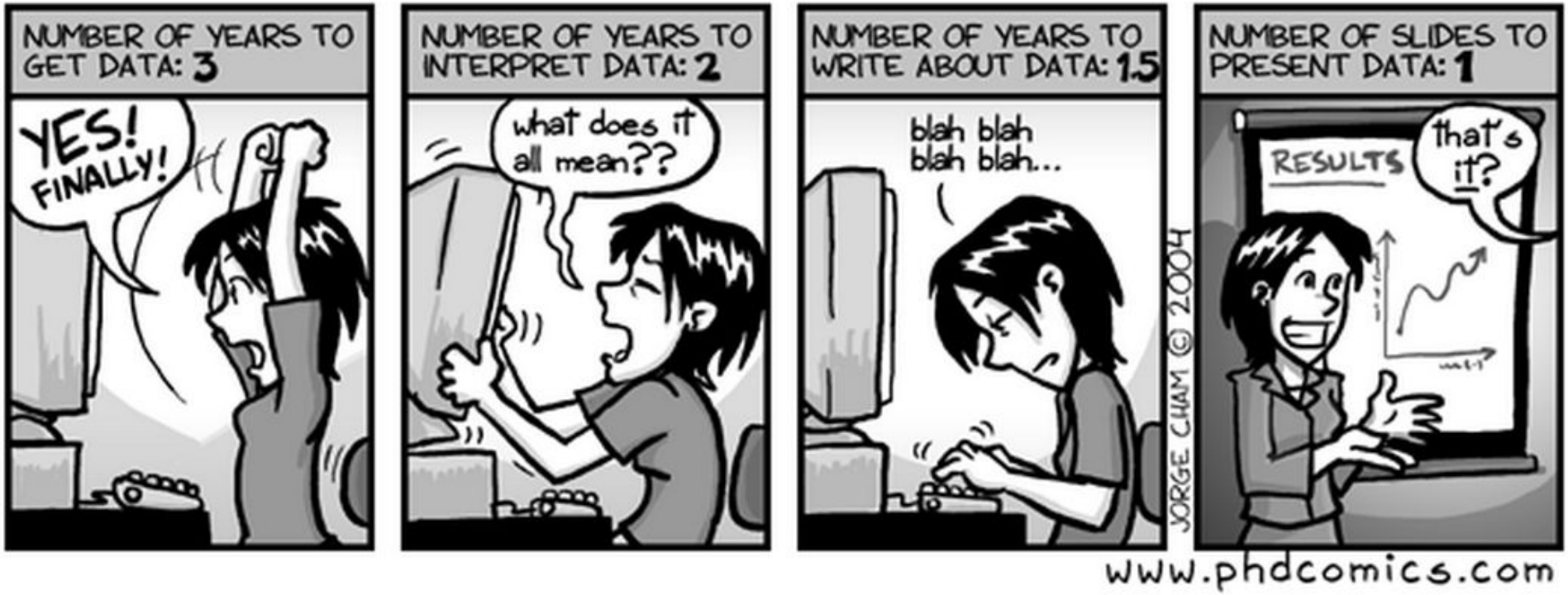
- Stat 150 Stochastic Processes
- Stat 151A Linear Modeling
- Stat 152 Sampling Surveys
- Stat 153 Times Series
- Stat 154 Predictive Modeling
- Stat 155 Game Theory
- Stat 158 Design of Experiments
- Stat 159 Reproducible Research

Roles for Stat 133



My Philosophy

DATA: BY THE NUMBERS



http://www.phdcomics.com/comics/archive.php?comicid=462

Data Preparation

- Acquisition
- Storage
- Cleaning
- Processing
- Tidying
- Reshaping
- Wrangling

Analysis

- Exploration
- Description
- Visualization
- Hypothesis Tests
- Inference
- Simulation
- Model Fitting

Reports

- Document(s)
- Article(s)
- Book(s)
- Poster(s)
- Blog post(s)
- Dissertation
- News

Communication

- Oral
- Print
- Web
- Audio
- Video
- Multimedia
- Other

Traditionally ...

Data

Analysis

Report

Communication

Traditionally, this is where most teaching focuses on

However ...

(almost) no one teaches this!

Data

Analysis

Report

Communication

In practice these are where we spend most of our time

Course Content

Course cornerstones

Data Manipulation

Data Visualization

Reporting Tools

Programming Concepts

Data Technologies

R
& other tools

Data Tables

1. Data Tables
2. Selecting and Filtering
3. Reshaping
4. Aggregation & Group by operations
5. Joins and Merges

Taking Care of Data

1. Storing Tables (files & formats)
2. Data Dictionary (metadata)
3. Data Organization
4. Cleaning
5. Data Tidying

Data Visualization

1. Visualization basics
2. Colors
3. Design and Aesthetics considerations
4. Efficient displays
5. Good and bad practices

Programming Concepts

1. Emphasis on **data analysis**
2. Data types and data structures
3. Control flow structures
4. Functions
5. Regular Expressions

Reporting Tools

1. Markdown syntax
2. LaTeX (mostly equations)
3. Dynamic Documents
4. Shiny Apps
5. Writing reports

R and other tools

1. R
2. RStudio
3. Command Line (Bash)
4. Unix filters & utilities

Instruction

In-person instruction

Lecture: more conceptual/theory

Lab: practice

Website & bCourses

Units: weekly topics

- Slides, readings, cheatsheets, files
- Lab materials
- Assignments
- Submissions

Grading Structure

8% Lab work (weekly; drop 2 lowest)

35% HW (6 assignments; drop lowest)

27% Apps (3 shiny apps; no drops)

8% Midterm

22% Final exam

Enrollment

Waitlist

Concurrent-enrollment

Some Comments

Remarks

Very hands-on course

Expect to do A LOT OF WORK outside class

Deceptively simple

Very easy to fall behind

Course Format

Lecture: conceptual stuff, demos, case studies, examples, review some code

Lab: practical work using R, command line, git

Homework: follow the work of labs, plus some challenges

My Expectations

Don’t expect that you’ll become a data scientist (that takes years of hard work)

Instead: give you solid foundations about data analysis

Expose you to different “data technologies”

Ultimate Goals

Understand different types of data (e.g. files, forms, formats)

Know how to access information stored in different formats

Know how to do data manipulation and processing in R

Be better prepared to crunch data

Becoming a data scientist is a (yearslong) **marathon** … not a (one semester) sprint

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