Lesson 01

Introduction to the class

Math 130
California State University, Chico
Last updated: 2020-07-22

Course Overview

This course is designed as a primer to get the complete novice up and running with the basic knowledge of how to use the statistical programming language R in an environment that emphasizes reproducible research and literate programming for data analysis.

The target audience is anyone who wants to do their own data analysis. The course will culminate with an peer-evaluated exploratory data analysis on either a pre-specified data set or your data set of choice.

Schedule of Topics

- Intro to the R language and it's packages
- R Studio suite of awesomeness
- Reproducible Research with R Markdown
- Getting things done using functions ( +  = )
- Getting data into R
- Managing the spreadsheet-like data frame
- Data Visualization
- Data Manipulation and Aggregation
- Exploratory Data Analysis

Logistics

Course materials

- All content is fully online on the course website
- Class time is spent expanding on ideas and concepts, working through assignments as a class or in pairs.

Grading

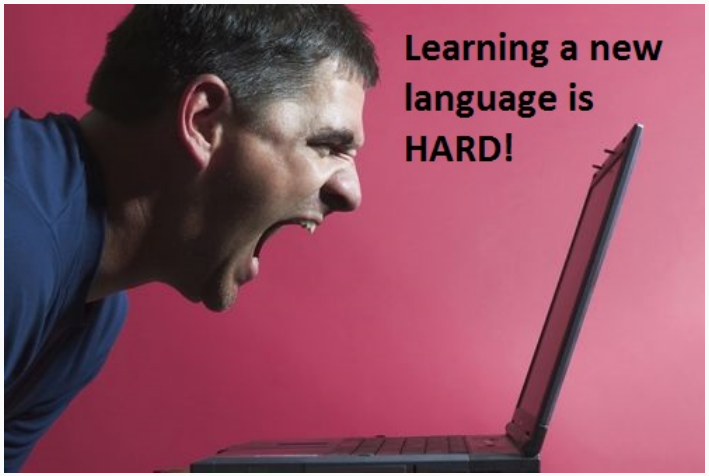
- Credit / No Credit. There are 100 points available in this course through attendance, assignments, and a final project.
- You must earn 70 points to receive credit for the course.
- The syllabus provides specific details on points per assignment.

Time Commitment

- Fast paced, we're hitting the ground running and only have 5 weeks.
- Expect to spend at least 10h/week on this class.
- Not designed to teach you everything about R, just enough to get going.
- Daily practice will pay off, results can be very rewarding

Warning: Effort and patience required!

- Minimal effort --> frustration and tendency to give up
- Work hard --> results out --> satisfaction + rewarding + confidence boosting



We've all been there. It will get easier...

...but you have to ask for help and use the resources available

Tool choices

The term "`R`" is used to refer to both the programming language and the software that interprets the scripts written using it.

RStudio is currently a very popular way to not only write your R scripts but also to interact with the R software.

We will be programming in the R language, using the R Studio platform. You will have to install both onto your computer. Setup instructions are in lesson 02.

Why use R?

- Open source, cross-platform, and free
- Great for reproducibility
- Interdisciplinary and extensible
  - Examples in Data Science, Economics, Natural Sciences, Psychology.
- Tons of learning resources
- Currently R is used in all of Chico's upper division Statistics & Data Science courses, as well as in some Biology, Geology, Economics, Finance, and at least one graduate level Political Science course.
- Does not involve lots of pointing and clicking (that's a good thing!)
- Works on data of all shapes and sizes
- Produces high-quality graphics
- Large and welcoming community

Why use R Studio?

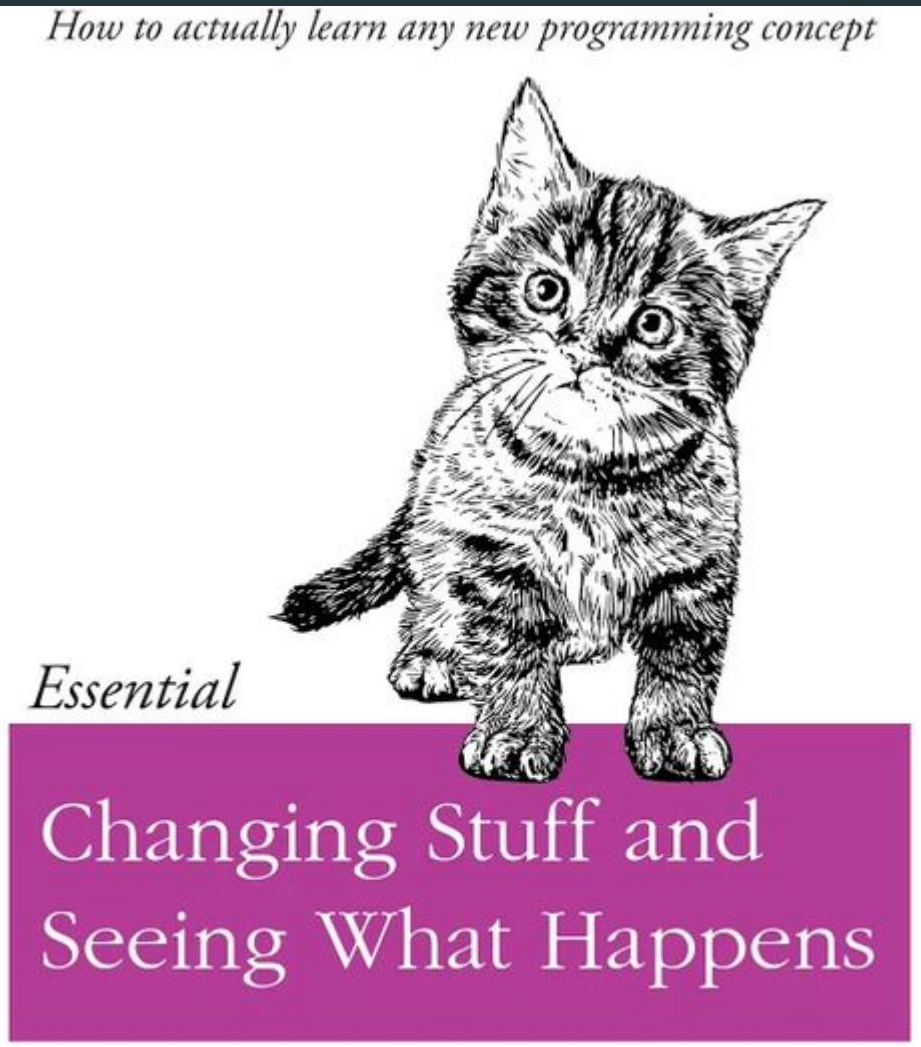
- Customizable workspace that docks all windows together.
- Notebook formats that allow for easy sharing of code and output, and integration with other languages (Python, C++, SQL, Stan)
- Syntax highlighting, warning errors when missing a closing parentheses.
- Cross-platform interface. Also works on Windows/iOS/Linux.
- Tab completion for functions. Forget the syntax or a variable name? Popup helpers are available.
- Free training videos available from the developers directly.
- Built in version control
- One button publishing of reproducible documents such as reports, interactive visualizations, presentations (like this one!), websites.

Examples of things you can do in RStudio

Programming is scary!

Learning to program has other benefits

- Improves your logical skills and critical problem solving
- Increases your attention to detail
- Increases your self reliance and empowers you to control your own research.
- Your PI will love your awesome graphics and reports.
- Some people think what you do is magic.
- Thinking graduate school? [expect to learn this on your own]
- [A few] [other lists] [of reasons]



Why no point and click?

Because it's not reproducible.

- Which boxes did you click last time?
- New data? Gotta do it all over.
- Need to expand your model? Gotta do it all over.
- Made a mistake in the data coding? Gotta do it all over...

Questions?