1. Introduction

Who are we?

- General intro
- R/statistics experience
- Substantive interests

Outline

- Logistics of Statistics II
- Assignments
- Github
- RStudio
- RMarkdown

Logistics of Statistics II

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Submit Assignments via Github	Lecture Get Assignment via Github	Work on assignment	Labs (drop-in)	Assignment of this week / readings for next week		

Syllabus

Week	Topic / Lecture	Assignment / Lab	Week	Topic / Lecture	Assignment / Lab
1	Counterfactual Causality	Intro / Logistics (mini mock assignment)	7	Regression Discontinuity Design	assignment
2	Potential Outcomes Framework	R revision / Tidyverse (mock assignment)	8	Difference-in- Difference	assignment
3	Causal Graphs	assignment	9	Panel data	assignment
4	Regression	assignment	10	Moderation	assignment
5	Matching	assignment	11	Validity & Generalizability	Revision / tba
6	Instrumental Variables	assignment	12	Planning & Evaluating	Revision / tba

Grading

- 40% weekly assignments, submitted via GitHub
 - Deadline: 11:59 PM CET on the day before the lecture
- 25% in-class or online final exam
 - Final exam week
- 35% final replication task, submitted via GitHub
 - Deadline: 22.12.2020, 11:59 PM

Weekly assignments

- Materials will be uploaded after the lecture
- Materials will consist of:
 - RMarkdown template with questions
 - Dataset
- Your task:
 - Get the assignment via GitHub
 - Work on the assignment in an RMarkdown document (in RStudio)
 - Knit the document to an HTML file
 - Upload both the R Markdown and the HTML file via GitHub

GitHub

- Version control platform
- Industry standard in any field where people code
- Allows collaboration
- Use through terminal, RStudio or desktop client

To Do:

- Create free account
- Download GitHub Desktop
- Send your GitHub username to Moodle survey!!



Basic Concepts GitHub

- Repository: Project folder where your files are stored. Git will track changes to anything in this folder.
- Clone: make a copy of a repository so you can access it on your local machine.
- Commit: When you make changes, you commit them to "save" them.
- Push: After you make a commit, you have to push them to the repo. Otherwise, they are just saved on your local machine.
- Pull: You can pull from the repo to access any changes made by other collaborators. This will give you the most recent version.
- **README:** File with information about the project.
- .gitignore: Files that you do not want Git to track (like data you don't want to upload)
- Branch: A copy of the repo you can make changes on without affecting others.
- Merge: If there are conflicts between your local copy and the copy in the repo, sometimes you may need to open the file and choose which version of the code to keep in order to merge the two versions.

Assignments with GitHub

Statistical Modeling & Causal Inference – Oswald | Ramirez-Ruiz

Each week, you'll be invited to a new private repository for your assignment

- Step 1: clone the repo on github.com to access it on your GitHub desktop app and the linked desktop folder
- Step 2: work on the assignment in RStudio and knit your markdown document to html
- Step 3: commit your changes and click push to submit your assignment (including both, the .html and the .Rmd file)

Example GitHub



RStudio

- Download latest version of R
- Download RStudio
- IDE to use R
- Free and open source
- Interface divided into 4 panes

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Editor in RStudio

- Source for your scripts and documents
- Only commands that are typed into a script can be saved
- Press cmd + enter to send commands to the console (to be executed)
- Comment your code using #

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Console in RStudio

- Immediate execution of R comments by the computer
- Display of results of executed commands
- Press enter to execute commands
- Shows > if ready to accept commands

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Environment in RStudio

• Environment and History

- Convenient monitor for data, variables, etc
- Helps with reading in files "manually"
- Often useful to clear environment when you run into troubles

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### **Rest in** RStudio

- Files/Plots/Packages/Help/ Viewer
- Displays Plots and Tables
- Overview of installed and loaded packages
- Help to learn more about packages and functions

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# R Markdown

RMarkdown is an authoring framework for data science. A single RMarkdown file can be used to:

- Save and execute code
- Generate high quality reports that can be shared with an audience

We will use RMarkdown to submit our weekly assignments.



### Headers in Rmarkdown

 YAML headers surrounded by "---"
 Mote data that guides the

Meta-data that guides the file build-up process.



### **R Code in** Rmarkdown

- R code chunks surrounded by ```
- Chunks take code as an input. It works just like usual R code.

start a chunk: ``` { r }
end a chunk: ```



### Text in Rmarkdown

 Text mixed with simple text formatting Takes text as input.

# H1
## H2
### H3
**bold text**
<pre>*italicized text*</pre>
> blockquote
1. First item
2. Second item
3. Third item
- First item
- Second item
- Third item
`code`

#### Statistical Modeling & Causal Inference – Oswald | Ramirez-Ruiz

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_		
	title: "Viridis Demo"	
	output: html_document	
4		
5		
6	(	⊕ ± +
7	library(viridis)	
8	***	
9		
10	The code below demonstrates two color palettes in the	
	[viridis](https://github.com/sjmgarnier/viridis) packa	ge. Each
	plot displays a contour map of the Maunga Whau volcano	in
	Auckland, New Zealand.	
11		
12	## Viridis colors	
13		
14	```{r}	0 = +
15	<pre>image(volcano, col = viridis(200))</pre>	
16	***	
17		
18	## Magma colors	
19	-	
20	```{r}	0 2 1
21	<pre>image(volcano, col = viridis(200, option = "A"))</pre>	
22	***	
23		
1:1	Viridis Demo ÷	R Markdown

___

## Mini Mock Assignment

- Get R, RStudio and GitHub Desktop running
- Generally, revise some R basics
- If you can, try to get the assignment via GitHub
- Look at the assignment, complete the tasks, push to GitHub
- We'll download and upload the assignment again together next week ^(C)

## **Coding issues**

Statistical Modeling & Causal Inference – Oswald | Ramirez-Ruiz

First, don't panic, take a step back. Then:

- 1. Check your code (missing parentheses, packages, stray commas, etc.)
- 2. Google the error message
- 3. Search on Stackoverflow or look on YouTube
- 4. Ask for help (from stackoverflow, friends, or your TA)

### **Further Resources**

- Reminder of the basics: <u>https://tinyurl.com/vkebh2f</u>
- A comprehensive guide to R: http://qpolr.com/
- RMarkdown: The definitive guide <u>https://tinyurl.com/y4tyfqmg</u>
- For any coding issues https://stackoverflow.com/
- Hertie's Data Science Lab Research Consulting