R for Research curriculum

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Introduction to the course

Getting Started

- Installing R and RStudio
- The RStudio Interface
- The R Console
- Data Types
  - Math operations
  - Operator (:)
  - character/strings
  - Objects

Packages

- Installing packages
- The tidyverse metapackage

Functions

- Mathematical functions
- Conditional statement
- String operation functions

Importing Data/ Exporting Data

- Data structures:
  - Data frame/Tibble
  - Matrix
  - Vector
  - List
- Understanding Data Structures
  - glimpse/str/dim
  - head
  - Tail
- Manipulating data
  - Indexing
  - Subsetting/Filtering
  - Mutating

Exploratory Data Analysis

- Handling missing data
- Frequency table
- Correlation test
- Aggregating data / Summarizing data
- Data visualization with ggplot2:
  - Tidy data structure
  - Creating basic plots:
  - Histogram
  - Density
  - Tile plots
  - Customizing plots:
  - Themes
  - Colors
  - Labels
  - Scales

Inferential Statistics with R

- T-tests
- Chi-squared tests
- Proportion table
- Testing Hypothesis
- ANOVA
- Linear regression:
  - Simple linear regression
  - Multiple linear regression.

Git/Github

- Introduction to Git and GitHub
- Creating GitHub account
- Create repository on GitHub
- Making repository locally available
- Collaborating with colleagues
- Pull/Push commits

Reproducible Research with Quarto

- Introduction to Quarto
- Creating and customizing Quarto
- Simple markdown syntax
- Embedding R code and Results in Quarto
- Exporting Quarto Document
  - Pdf
  - Html
  - Docs.

Capstone Project:

- Import, clean, analyze and visualize data
- Collaborate with colleague
- Create a final report exported as PDF.