Introduction to R for statistics: Level 1

Session 1: Welcome to R & RStudio

Objective: Student can install and load an R package and navigate the RStudio IDE

- What is R and when would I use it?
- R plus RStudio
- Installing and loading packages
- Basic arithmetic and comparison operations
- Saving, closing and loading scripts
- Opening help documentation
- Plotting graphs
- Assigning objects

Session 2: Data types in R

Objective: Student can create, inspect and modify vectors and data frames

- Creating vectors
- Vector operations
- Indexing elements of a vector
- Creating a data frame
- Data frame operations
- Indexing data frames
- Column calculations
- Filtering and subsetting a data frame
- Conducting exploratory data analysis on a data frame

Session 3: Introduction to the tidyverse

Objective: Student can read, write and analyze tabular external fines

- Reading and writing csv and txt files
- Reading and writing Excel files
- Exploring a dataset
- Descriptive statistics
- Manipulating rows
- Manipulating columns
- Summarizing data

Session 4: Exploratory analysis with the tidyverse

Objective: Student can explore and visualize data

- Building a data pipeline
- Joining two datasets
- Reshaping a dataset
- Graphics in base R
- Visualizing a variable's distribution
- Visualizing values across categories
- Visualizing trends over time
- Graphics in ggplot2

Introduction to R for statistics: Level 2

Session 1: Descriptive statistics

Objective: Student can classify, visualize and explore variables

- What is tidy data?
- The tidy workflow
- Describing, visualizing and manipulating categorical variables
- Describing, visualizing and manipulating quantitative variables
- Describing and visualizing correlations

Session 2: Hypothesis testing

Objective: Student can perform various statistical hypothesis tests

- Independent samples t-test
- ANOVA
- Paired samples t-test
- Chi-square test of independence
- Bivariate linear regression

Session 3: Statistical modeling

Objective: Student can build and evaluate statistical models

- Multiple regression
- Sampling
- Bootstrapping and confidence intervals

Session 4: Communicating results

Objective: Student can share and communicate their work effectively

- Building custom ggplot2 plots
- Defining functions
- Creating documents with Quarto
- GitHub and workflow basics