NATURAL RESOURCES 775
R PROGRAMMING FOR NATURAL RESOURCES
SPRING SEMESTER 2022, 3 CREDITS

Instructor: Dr. Jared Homola
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Classroom: Trainer Natural Resources Building (TNR) 356

Time: Monday and Wednesday 9:30-10:45am

Objectives: At the completion of the course, students will be able to: (1) understand the basic components of R such as functions and data structures; (2) read in and process data; (3) write functions, loops, and conditionals; (4) create a wide variety of data visualizations; and (5) code basic statistics that are commonly used in biology. Most importantly, this course will teach students how to think like a programmer and how to properly use help documents. The overall goal of the course is to give students the tools necessary to tackle new tasks in R that were not covered in the course. The course will be split into two main themes: learning the principles of R programing (weeks 1-8), and learning how to code statistical analyses in R (weeks 9-16).

Textbook: R for Data Science: Import, Tidy, Transform, Visualize, and Model Data. Hadley Wickham and Garrett Grolemund. Free digital version available at https://r4ds.had.co.nz/index.html. Additional readings from various online sources.

Format: Lectures will discuss programming principles and syntax. Reading assignments will be assigned for some lectures. Lab periods will consist of programming exercises that build on lectures and prepare students for the homework assignments. The grade for this class will be based entirely on homework assignments. There will be one homework assignment each week. Two of the homework assignments will be larger in scope and will serve as a midterm and final. The final homework will require data analysis of the students' own data and a short write up formatted like a scientific paper. If the student does not have their own data, a dataset will be provided. Homework assignments will be assigned after lab on each week and will be due before class the following week.

Grading: Assignments will not be accepted if they are turned in after the due date, other than for extenuating circumstances such as a family or health emergency. Final grades for the course will be awarded using the following minimum values: A = 93%; A- = 90%; B+ = 87%; B = 83%; B- = 80%; C+ = 77%; C = 73%; C- = 70%; D+ = 67%; D = 60%; F = <60%. The final class grade will be based entirely on homework assignments. Normal homework assignments will be worth 20 points and the larger homework assignments will be worth 60 points.

Schedule

Section I: Intro to coding in R

Week 1	Introduction to R, basic math and objects
Week 2	Data types, finding help, & coding etiquette
Week 3	Intro to the Tidyverse
Week 4	Data wrangling I
Week 5	Data wrangling II
Week 6	Writing functions

Section II: Data exploration & visualization

Week 7	Data exploration
Week 8	Data exploration
Week 9	Spring break
Week 10	Data visualization:
Week 11	Data visualization:
Week 12	Data visualization: Mapping

Section III: Basic statistical applications

Week 13	Basic regressions
Week 14	Advanced regressions
Week 15	Simulations: resampling/bootstrapping
Week 16	Non-linear models
Week 17	Multivariate statistics