GIS in R (Fall 2024): Schedule

Note: Some elements may be modified to best meet the needs of our students.

Week 1 (21-27 Oct): Foundations

Total video runtime: 1:52:28

Overview: Here we will introduce the primary tools that we will use in this course. Much of the material this week will be a review of pre-course content.

Topics include:

- Reading, exploring, and writing data
- Functions
- Data visualization (ggplot)
- R Markdown
- Introduction to GIS

Week 2 (28 Aug - 3 Nov): The tidyverse

Total video runtime: 1:48:37

Overview: This week will be a crash course in tidyverse basics. Most of you have identified tidyverse skills in your application materials, so much of the content will likely be review. We will continue to build on tidyverse skills throughout this course.

Topics include:

- Tidy data principles
- Reshaping data frames
- The pipe operator
- Mutation
- Subset data frames (e.g.,, filter, select, slice)
- Summarize

Week 3 (4-10 Nov): Introduction to shapefiles

Total video runtime: 1:31:01

Overview: This week will be our first foray into working with spatial data! We'll be learning the basics of the sf package and then use spatial and non-spatial joins to maximize the efficiency of our spatial data workflow. *Note: As much of the remaining course content is expected to be new to our students, the total video runtime is much lower from this point on!*

Topics include:

- Introduction to shapefiles with sf
- Joining data frames
- Spatial and non-spatial joins with sf

Week 4 (11-17 Nov): Iteration and tmap

Total video runtime: 1:22:29

Overview: For those who are new to iteration, this will likely be the most challenging week of the semester. Iteration is a core concept across programming languages and becomes especially useful when addressing repetitive tasks associated with using R as a GIS. At the end of the week, we'll learn to use tmap – a user-friendly package for visualizing spatial data.

Topics include:

- Iteration with purrr
- Applying iteration to spatial data
- Introduction to tmap

Week 5 (18-24 Nov): Advanced shapefiles and introduction to rasters

Total video runtime: 1:26:34

Overview: This week we'll finish up the core concepts of working with shapefiles and introduce working with raster data in the terra package.

Topics include:

- Advanced sf
- Additional sf tools
- Introduction to raster data

Week 6 (25 Sep - 1 Dec): Categorizing vectors, shapefiles, and rasters

Total video runtime: 1:26:13

Overview: This week will be all about classifying data (i.e., defining categories for continuous data or reclassifying categorical data). We'll work with non-spatial data at first and then apply those concepts to spatial data at the end of the week.

Topics include:

- Classifying and reclassifying values
- Working with factors using the forcats package
- Categorizing spatial data

Week 7 (2-8 Dec): Rasters and spatial patterns

Total video runtime: 1:26:13

Overview: This week we'll push the envelope a bit further by addressing concepts such as conducting terrain analyses of raster data, deriving density and distance rasters, and toe-dipping into the all-important concept of spatial autocorrelation.

Topics include:

- Advanced rasters
- Spatial autocorrelation

Week 8 (9-15 Dec): Shiny (optional)

Total video runtime: 1:09:09

Overview: Our final week of this course will be optional (*but certainly suggested!)*. Although you will not be tested on this material, we'll look at how to explore memory usage and build shiny applications for spatial data. Shiny applications are an awesome way to share geographic data with others! But … why is week 8's video content so short *and* optional? This is to give you adequate time to work on the final project – a carefully crafted problem set that has been designed to assess your ability to integrate knowledge across the semester.

Topics include:

- Memory management
- Control flow with if … else
- Introduction to shiny apps
- Making a shiny dashboard