

KDI SCHOOL OF PUBLIC POLICY AND MANAGEMENT
GEOSPATIAL DATA ANALYSIS IN R

Semester: Fall 2024

Time: TBD

Lecture Room: TBD

Professor: Josh Merfeld

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Office Hours: TBD

COURSE DESCRIPTION

Intro

Keywords

geospatial, data science, R

Text Book

Textbook?

R for Data Science (Wickham and Grolemund). This is available for free [here](#). Please note that this guide does not introduce most of the topics we will discuss in class.

However, it is incredibly helpful for getting started in R.

R Markdown: The definitive guide (Xie, Allaire, and Grolemund). This is available for free [here](#). This guide will help you learn about using R Markdown, which is a very handy way to write using R.

Readings

From time to time, I may ask you to read things before class. I will make this clear each week and will post the readings on the class website.

Course Requirements (Pre-requisites)

Experience with R.

Evaluation

1. Homework – coding tasks (30%): Throughout the semester, I will assign two to three coding tasks related to the material we cover in tasks. You will be required to do these tasks in R, turning in a write-up using R Markdown.

2. In-class labs – coding tasks (20%): We will have two in-class labs, in which you will work together in groups to complete a coding task. You will be required to do these tasks in R, turning in a write-up using R Markdown by the end of class.

3. Final exam (40%): The exam will be a take-home exam, due during finals week. It will include questions on content as well as some coding tasks.

4. Participation (10%): I expect you all to come prepared to class. This includes having read the assigned material. Participation will be graded based on your participation in each class. *You will be required to bring a laptop to class.*

This course includes Korean development experience (***please check Yes or No**)

☐ YES

☒ NO

This course utilizes resources from KSP (Knowledge Sharing Program), K-Developedia, or Modularization report (***please check Yes or No**)

☐ YES

☒ NO

COURSE OUTLINE

Week 1

Introduction

- Introduction to the course and material
 - Expectations
- Introduction to R, R Markdown

Notes

- **Please come with R and RStudio already installed on your computer.** You are also welcome to use a different code editor, like VS Code. You can find instructions on getting started with R [here](#) and [here](#).

Week 2

Coordinate reference systems and vector data I

- Introduction to shapefiles
- Types
 - Points
 - Polygons
 - Lines
- Introduction to coordinate reference systems
- The *R* package *sf*
- Mapping shapefiles

Readings

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Week 3

Coordinate reference systems and vector data II

- Introduction to shapefiles
- Types
 - Points
 - Polygons
 - Lines
- Introduction to coordinate reference systems
- The *R* package *sf*
- Mapping shapefiles

Readings

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Week 4

Data extraction I

- Combining shapefiles
- Overlap analysis
- Distance analysis

Readings

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Week 5

In-class lab

Week 6

Rasters

- Introduction to rasters
- File types
 - .tif
 - .netcdf
- The *R* package *terra*
- Mapping rasters in R

Readings

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Weeks 7

Data extraction II

- Combining shapefiles and rasters; spatial joins
- The *R* package *exactextractr*

Readings

Week 8

Accessing geospatial data

- Where does the data come from?
- APIs
- Direct downloads

- Google Earth Engine (less focus due to use of Javascript)

Readings

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Week 9

Spatial interpolation

- Inverse distance weighting (IDW)
- Kriging

Readings

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Week 10

In-class lab

Week 11

Reading week

Week 12

Take-home final exam due