

Final Project

Your term project focuses on a geoprocessing or spatial analysis task of your choosing. The project objective is at your discretion. However, the best projects are typically the ones that have some special salience to you - perhaps related to your current research, employment, career goals, or hobbies. The project **must** use R, and it **must** address a "spatial problem." Further, the project should emphasize the problem you wish to solve, rather than the number of lines of code you write. It is strongly encouraged that your project *slightly exceed* your programming skill level. There is strong research suggesting that we learn most effectively when we "stretch" ourselves just beyond our current skill/knowledge level.

Deliverable 1: project proposal (50 points)

You must submit a proposal for your project detailing the following items:

1. What is the topic area and problem of interest
2. Why are you interested in this problem/area
3. How your proposed project will make the task more efficient, more accurate, more consistent, or easier.
4. Why the problem/task cannot be solved using standard "out-of-the-box" tools from ESRI or other GIS software packages/modules.
5. What you expect the outcome of the project will be. Note, you will always provide your code, so think about how you would define "success" for your objective (e.g., a measurement of efficiency, a completed task, completed analysis)
6. Preliminary or sample data
7. Any preliminary work (strongly encouraged)

If you are having difficulty developing your own research question(s) and data, I have a list of candidate questions you may use as inspiration. (see the `research_question_inspiration` file in this GitHub directory)

Other details:

- 1-2 pages, inclusive of figures
- Microsoft Word document or PDF
- 1-inch margins
- Font: Times New Roman, size 12, 1.5 spacing or less
- Cite all sources using a standard referencing format (e.g., Chicago, APA, your favorite journal). However, you may NOT use an end note style.

Deliverable 2: in-class project update (25 points)

You will give a 3-5 minute presentation to the class that will cover:

1. Your objectives, topic area, and/or problem of interest
2. What tools you are using to accomplish the task
3. Your current progress in accomplishing the task
4. Evidence of work
5. Any issues or challenges you have encountered

The class is expected to listen attentively and ask questions of the speaker. You should be prepared to answer questions from your peers and instructor.

Deliverable 3: in-class final presentation (75 points)

You will also give a final presentation during the final week of class detailing the full extent of your project work and accomplishments. Undergraduate students will give a 7-10 minute presentation, while graduate students will give a 10-13 minute presentation. *Graduate students are expected to draw upon the work of others (e.g., scientific literature, reports, technical documents) to situate their work in a broader context.*

In this presentation, you will at a minimum discuss:

1. Your objectives/problem/task
2. How you accomplished the task - or if you did not, why not
3. Obstacles, challenges, etc. you faced during the work

4. Your results - including a discussion about how you measured success (look back to your proposal)
5. The implications of your work (e.g., for your research, job)
6. Future goals and objectives

Deliverable 4: final report (250 points)

Your final report will follow the format of a short technical report where you should provide:

1. A short introduction to the topic
2. (Required for graduate students, optional for undergraduates) background on how this problem and methods have been addressed in the work of others (e.g., scientific literature, reports, technical documents)
3. A methods section detailing the work you completed
4. A results section that explains, in detail, what you accomplished. Be sure to connect to how you defined success in the project proposal (e.g., what should be understood from them)
5. A discussion section that covers the implications of your results, including a critical self-reflection of the project (e.g., what limitations, assumptions, or uncertainties are present). Also, what have you learned and what would you do differently next time (and why)?
6. A conclusion that wraps everything up

Other details:

- 2 pages exclusive of figures (graduate students 3-4 pages)
- At least three figures, two of which must be maps
- Microsoft Word document or PDF
- 1-inch margins
- Font: Times New Roman, size 12, 1.5 spacing or less
- Cite all sources using a standard referencing format (e.g., Chicago, APA, your favorite journal). However, you may NOT use an end note style.
- It is strongly suggested that you format your text using an RMarkdown notebook or Quarto document

Code

- You must also submit your code and any data (if sharable and of reasonable size) via GitHub. I must be able to run the code on a similar computing environment to yours
- I expect your code to be readable and documented at a minimal level. However, graduate students must fully document all functions and tasks completed by their code. You do NOT need to document every instance variable or line of code, but your script should be exceptionally well-formatted and documented. There are multiple examples of standards and best practices on the web.