CE 311K: Final Project Overview

Project Overview

For this final project, you have a chance to apply the programming techniques learned throughout the semester in a deeper, more focused way. You can select one of the **Provided Projects** (with a preset problem outline) or **propose your own custom project**. Either way, you'll demonstrate your ability to analyze data, generate useful outputs, and write clear, modular Python code.

📅 Timeline

- **April 7–14**
  Submit your **one-page project proposal**.
- **April 14–21**
  Receive instructor feedback or meet to discuss your proposal and get the go-ahead.
- **April 21–May 1**
  Work on your project.
- **Final Submission** (Due on the last day of the course)
    1. **Colab Notebook**
    2. **Short Written Analysis** (about a page, can be a PDF, Word doc, or Markdown)
    3. **Copy of Your Original Proposal** (re-uploaded alongside your final files)

↪️ Paths to Choose From

1. Provided Project

We've prepared several **Provided Projects** (for example, Urban Heat Island Effect Analysis, Building Energy Consumption Predictor). Each of these includes:

- A **project description** with background and objectives
- **Major Questions** for your proposal
- **General procedures** to help you work through the problem
- **Data** (if needed)

Proposal Requirements for Provided Projects

1. Directly answer each project's **Major Questions** in your proposal.
2. Outline a rough approach or plan (flowchart, bullet points, etc.) for how you expect to solve it. Feel free to "whiteboard" your approach and include a photo.
    - It's **okay** if you aren't 100% certain yet or if you need to adjust your approach later on.
3. Minimum one page in length. Maximum two pages.

> **Important**: You **do not** need to write a separate problem statement. The project description already covers that. Just answer the Major Questions and give a brief sense of your approach.

2. Custom Project

If you'd like to design your own project, feel free! It **doesn't** have to be strictly tied to civil, architectural, or environmental engineering, but the project should be **related** to your future career or studies. Follow these guidelines in your proposal:

1. **Problem Statement**: Summarize the problem or topic you want to explore.
2. **Project Goals**: What exactly do you plan to accomplish?
3. **Approach**: Outline a rough approach or plan (flowchart, bullet points, etc.) for how you expect to solve it. Feel free to "whiteboard" your approach and include a photo.
    - It's **okay** if you aren't 100% certain yet or if you need to adjust your approach later on.
4. **Expected Outcomes**: What do you think you'll learn or produce?

> **Important**: Do to the nature of this approach, you *will* need to meet (in-person or virtually) with your instructor to discuss your proposal and get the go-ahead.

📋 Final Submission Deliverables

By the deadline, you must provide:

1. **Colab Notebook**
    - Your Python code (modular, well-documented).
    - Any data processing or analysis steps.
2. **Short Written Analysis** (about a page)
    - Summarize the **main findings** or insights from your work.
    - Discuss any **challenges** and how you dealt with them. Focus more on issues you encountered with programming rather than with the topic.
    - Reflect on what you found most interesting or surprising.
3. **Copy of Your Original Proposal**
    - Turn in the same proposal you submitted in April so we have everything in one place.
4. **Data File** [Depends on Chosen Project]
    - Some projects will require you to submit a data file. This will be *clearly* specified in the project description.

🐍 Programming Requirements

Each project (Provided or Custom) must include:

1. **At Least Two Python Functions**: Use docstrings to explain the purpose, parameters, and return values.
2. **At Least Two Instances of Error Handling**: These could involve file I/O issues, invalid user input, or data-related errors (e.g., missing fields). Think `try/except` blocks.
3. **At Least One Loop**: This can include a `for`/`while` loop or a list comprehension.

4. **At Least One Conditional**: An `if/else` or other branching logic.

5. **At Least One Figure**: A graph, chart, or other plot generated by your Colab notebook - this is a note for those pursuing a Custom Projects. All Provided Projects will ask for visualization of the results.

⭐ Grading Criteria

- **Proposal (10%)**: Clear, well-organized, and addresses all requirements.
- **Code Quality (40%)**: Clear, modular structure and readability; good documentation; logical flow.
- **Functionality (30%)**: How well the code accomplishes the project's goals and processes data accurately.
- **Analysis (20%)**: Quality of your written (insights, clarity, reflections) and programmed analysis (metrics, models, visualizations).

🤖 AI Use

As with your previous assignments, you are welcome to use AI tools to help you with your project. However, you should use AI tools sparingly and only when necessary. You should also always understand the code that you generate and be able to explain it to someone else. Always attempt writing the code yourself first and then using AI to help debug or improve.

"Vibe Coding" is *not* allowed.

🤝 Office Hours and Support

- **Proposal Feedback**: After April 14, you'll receive written comments or an invitation to discuss your idea one-on-one.
- **Office Hours**: Regular weekly hours remain available for extra guidance.
- **Additional Office Hours**: Special sessions will be hosted during finals week (April 28–May 2) to address last-minute questions or troubleshooting.

Feel free to drop by if you need help with data sources, debugging, or finalizing your approach. Good luck, and enjoy exploring Python in a hands-on, practical way!

🤗 Final Note

As surprising as it may sound, the goal of this project is for you to have fun. I hope you either find one of the Provided Projects intriguing or create a Custom Project around a topic you truly care about. The last thing I want is for you to be stressed or have undue anxiety. If you start to feel overwhelmed, please reach out.

You shouldn't spend more than about six hours on this project (including preparing your proposal), unless you're really enjoying yourself—then go wild! If you find yourself nearing the six-hour mark, let's discuss your progress and the next steps.