Ph322 Computational Physics Student Project Spring 2025

Project scope This project is an opportunity for you to apply the computational skills you have learned this term to a project or problem of your choosing. You have wide latitude in choosing the topic for your project. If you currently work in a research lab, I encourage you to work on a problem related to your research. This might involve data and statistical analysis, calculations, visualizations, image analysis, you name it. The topic doesn't necessarily have to involve physics but it needs to be quantitative. Other possibilities include solving a particularly challenging physics or math problem from a textbook or journal. You might wish to peruse the journal *The Physics Teacher* for interesting ideas, or other math, physics and astronomy journals. You might use 3D graphics from VPython and create an educational app like the PHets you may be familiar with (https://phet.colorado.edu/). If you have an idea but are unsure if it is suitable, please ask.

Requirements Along with your code write a companion paper that describes your project and results. It should include an appropriate *Title*, an *Introduction* that motivates your project and provides background, a *Methods* section that describes what your code does and the numerical methods it uses, a *Results* section that includes results or demonstrates what your code does, and a Conclusion. Include *References* as needed. You should submit your project as a Jupyter Notebook and intersperse your code through your notebook as appropriate. You will give a 4-5 minute presentation of your project on the last day of class.

Python Modules –Standard modules include numpy, math, matplotlib, and scipy. Please okay any non-standard Python modules with me.

Time commitment This project is worth 15% of your grade. The time you spend on it should be commensurate with about the time spent you spend on two homework sets. This includes the time spent writing your code and the companion paper.

Rubric

Creativity (10%) – Originality of problem or solution
Code (30%) – Functionality, readability, modularity, and use of good practices
Depth of project (30%) - Technical difficulty; appropriate use of computational methods
Paper (20%) - Clarity, completeness, grammar, and logical structure
Presentation (10%) - Clarity, delivery, visuals, and time management

- Any files needed to run your code should be included in a zipped folder.