f) Oral presentations will take place during the last week of class, some during coding session, others during an evening session. Dinner will be provided.

Computational technique requirements:

Your project should use at least two of the following computational techniques discussed in class –

a) Numerical integration.
b) Numerical differentiation.
c) Non-linear equation solving.
d) Matrix algebra on a computer.
e) Numerical ordinary differential equation solving.

OR (if you are feeling brave), one of the following computational techniques which will be touched on in the last few weeks of class ….

a) Monte Carlo techniques.
b) Partial differential equations.
c) Fourier analysis.
d) Curve fitting, Levenberg-Marquardt minimization.
e) Machine learning

Grading/expectations

I (and not the homework graders), will grade the final project. On each of the below requirements, I will grade on a 1-5 point scale, where the numbers mean…

1) No effort made.
2) Cursory effort made.
3) Reasonable effort made, but with some serious missteps.
4) High-quality work, mostly meeting the mark.
5) Outstanding work, at the level of the example problem sets on weekly assignments.

The requirements are

Report:

1) Your report must be typeset in LaTeX, use the RevTeX style manuals used by Physical Review Journals.
2) Figures should have clear labels and captions. All figures should be referred to in the text and tell part of the narrative.
3) Your paper should have a clear abstract, no more than a paragraph, that highlights what you have done.

95/100 overall — nice job

4) You should explain the context and motivation of the physics problem you are solving.
5) You should write-down all equations solved by your code in the report.
6) You should explain the computational methods used to solve these equations – if they are methods that were discussed in class, say so! You are welcome to use libraries (e.g. scipy) instead of writing things from scratch, but be sure to acknowledge all libraries used.
7) Have a discussion or figure showing that your code can reproduce a classic test case or known solution If you failed to reproduce published results or classic test cases, please hypothesize why.
8) If your code produces some numerical result (e.g. the binding energy of something), have the result stated clearly in a table. If you noticed an interesting trend, have clear figures showing that trend.
9) You should have a clear reference list, typeset using BibTeX, citing all methods/outside software packages used.
10) You must read and draw on 2 primary physics literature references (if you are doing a topic I suggested, these must go beyond the suggested reading), and as many pedagogical/textbook references as you like.
11) If your code takes more than a few minutes to run, explain the computational challenges of your project in the report.

50/55— good job but neglects surfaces of section and nonlinearity, which are important conceptual aspects. Good job with equations of motion and qualitative discussion of chaos

Code:

1) Does the code run?
2) Is the code well structured?
3) Is the code well documented?
4) Is the code self-sufficient?
5) If the code takes a long-time to run, is an explanation of requisite resources/libraries provided?

25/25

Presentation: 20/20

You should prepare a keynote/Powerpoint style presentation on your work. This presentation should

1) Lay out the motivation for the physics problem to be solved.
2) Lay out the equations to be solved.
3) Have helpful schematics to explain the problem.
4) Name the computational methods used or to be used – if they were covered in class, review them. If not, briefly explain them.
5) Explain what code you have written and what it is intended to do?

6) Explain if your code is working. If yes, show some preliminary results (preferably as a graph or animation) and discuss if they make sense to you. Why or why not? What do you plan to try in this project? What are the next steps? If not, what are you doing to troubleshoot your code and what are the major sticking points?

Presentation:

You should prepare a keynote/Powerpoint style presentation on your work. This presentation should

1) Lay out the motivation for the physics problem to be solved.
   5
2) Lay out the equations to be solved.
   3—discuss core diffraction equations but application not explained
3) Have helpful schematics to explain the problem.
   5—nice use of images
4) Name the computational methods used or to be used – if they were covered in class, review them. If not, briefly explain them.
   3—covered basics but could be less cursory

   I skipped coding rubric points – you went early when you didn't have to and I respect that!

Funny invitation for hard questions 😊

Good motivation from homework and astronomical images. Bessel function. Starts with example code. Diffraction patterns due to support vanes holding up secondary mirror.

DG advice – start with no vane and see if you can numeircaly reproduce Bessel function.

Goal – circle, hexagon, tiled hexagon, tiled hexagons with gabs, webb.

Goal -- Using an experimental data from Strawbridge observatory.

Fast blitz through chematic, but there.