

## P3800 Project 4: Choose Your Own Problem

For Project 4, you should pick an interesting physics problem and investigate its solution numerically. You may work alone or with a partner. You should learn something new, in the physics or methods or preferably both. The core problem should be small enough to get something finished, but allow for exploration. You should apply what we've been doing for the other projects in terms of Makefiles, scripts, latex, plotting etc.

Sources for project ideas may include

- problems, exercises and projects from textbooks on computational physics (see course outline and also [Introduction to Computer Simulation Methods](#) by Gould, Tobochnik and Christian)
- projects laid out in the MacKinnon Notes (link in the Project 2 section of webpage)
- similarly well laid out problems from other sources (these require instructor approval).

**N.B. This year I'm banning topics like planetary motion and similar few-particle trajectory-type problems. If you're not sure about your topic, please ask.**

The oral presentations should be 3 minutes, 4 minutes if you are working in a pair (in which case both should speak for about 2 minutes each). I'm not looking for a fancy presentation. In preparing "slides", you may use any software such as PowerPoint, Google slides,  $\text{\LaTeX}$  using the `beamer` class ([short example](#)), or you can even scroll through a point-form version of your latex write-up. Actually, that's a good way to go: start with section headings and point-form content along with figures – this version will essentially be your presentation – and then fill it out with text for your report. 3 minutes is really short, but long enough to convey quite a bit if it's thought through. In Three-Minute-Thesis competitions, often only a single slide is allowed. You decide how many slides to use.

**N.B. We may adjust the time allowed for presentations depending on how many we have.**

Both oral presentation and write up should describe

1. The physics problem
2. Method of solution, or methods if you plan on comparing two or more
3. Solution(s) to the problem

4. Tests or exploration of method – size, stability, speed, comparison between methods etc . . . whatever is appropriate and/or extension of physics problem to other cases, including greater complexity etc.
5. Discussion and Conclusions – the discussion should include ideas for what you would do next

Be concise for the oral presentation! You don't have to say everything that you did. The oral presentation will basically be marked on how well the above points are conveyed within the allotted time.

The marking scheme for write-ups will be the same as for the other projects, but with the 40% for “completion of tasks” replaced with “depth of investigation”, i.e. how far you pushed on physics complexity, analysis of method etc.