Lab Report Guidelines

Stuff I Generally Look For

Here's the (rough) rubric I use when grading your report:

- **Theory: (2 points)**:
  - A writeup of the physics principles and equations used in the experiment.
  - Your writeup should demonstrate that you actually understand the concepts. You should derive equations, show how they relate to each other, etc.
  - In many ways the theory writeup is an opportunity for you to actually learn the material and make some notes on it. If you already have your own notes, use them!
  - You should always do research/reading beyond what's given in the manual. The manuals are an ok place to start but they're usually pretty light on detail. This semester I'll try and post some resources for further reading.
- **Experiment setup: (2 points)**:
  - A description of what exactly you did in the experiment.
  - The variables you measured, the instruments you used to measure them, the assumptions you made.
  - Diagrams are good.
- **Presentation of data: (1-2 points)**:
  - Clear presentation of data.
  - This includes tables, graphs, equations, calculations, etc (as applicable; not all experiments require all of these).
  - Please label/signpost your content! Otherwise I won't know what I'm looking at. Perhaps contrary to popular belief, I am not some omnipotent God of The Labs. Although I've (probably) read the lab manual, by the time I get to grading your report I'll have basically forgotten everything about it. If you put something (e.g. a table) in your report without labeling what it actually is and what experiment it corresponds to, my initial reaction will probably be one of bafflement, not understanding.
- **Analysis of results, discussion questions: (2-3 points)**:
  - A discussion of your results. You should explain what they show, and how they demonstrate the physics principles from your theory section.
  - Compare your experimental values to the theoretical ones. Why are they different? (see: sources of error).
  - You should answer the questions in the manual. Often these questions are an important part of the discussion, and you should try and integrate your answers into this discussion. It's also totally fine if you answer the questions separately.
- **Sources of error: (2 points)**:
  - Factors that may have caused impresicions/inaccuracies in the results.
  - Your sources of error should be relevant. This is important—don't just randomly list "ad hoc" sources of error. You should explain why a particular source of error might account for the *specific* discrepancies you see in the data (e.g. damping/friction is a reasonable source of error if your experimental results are *underestimates*. If your results are overestimates, friction doesn't really make sense. Use your intuition, etc).
  - It's also worth nothing that sometimes the equipment we use in these labs is a bit old and terrible. If you can't figure out why some results are off, it may just be that the equipment was bad. Ask me if you're unsure.
  - Feel free to critique the experiment design. I always take kindly to this.
- **Bibliography/references:**
  - I won't grade this, but if you use external sources (as indeed you should) you should state them.

Stuff I Generally Don't Care About

- **Formatting:** beyond typing your report, you can use whatever style/format you want. Aesthetic frippery is not necessary. Simple and functional reports are completely fine.

- **Grammar and writing style:** definitely not important. Just as long as it basically makes sense.
- **Structure:** is actually somewhat important, but I (probably) won't take points off for it, since it usually boils down to arbitrary preferences/conventions. If I think there are improvements you can make to how you organize your report, I'll let you know in my comments. Again, just make sure I can basically follow what you're saying.
- **Conclusion:** you're really just restating what you already said, so there isn't really a pedagogically-motivated reason you need to spend too much time on this (if at all). I'll leave it up to you. In general you don't need to write anything that feels "fake".

Error Analysis

Refer to NYU's guide on error analysis.

- In general you should state the numerical uncertainties in experimental/measured values.
- If you have an array of data (e.g. if you have many measurements of a single variable or outcome) it's useful to give summary statistics (mean, standard deviation, etc).
- Sometimes you will have to multiply two or more experimental values together. When you do this, you may find it quite cumbersome to compute the uncertainty in the final value (the uncertainty becomes a quadratic function—see the error analysis guide). If you have a whole table of data it'll take you a very long time to do all these calculations by hand. I urge you not to write off your time repeating menial calculations. If you compute one of the errors and you find that the uncertainty is sufficiently small (i.e. small enough that it doesn't really affect the results), I'm happy for you to just conclude that the uncertainties aren't significant (obviously you need to justify yourself). If the uncertainties are actually significant, you should use software to compute them. If you don't know how, let me know. I will post some code that does the computations for you.

Grading Errors

If you think I've graded something wrong or unfairly, please let me know. I do miss things occasionally so I'm happy to resolve any issues you have.