

# Lab Report Tips

## Stuff I Generally Look For

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

- **Theory: (2 points):**
  - A writeup of the principles and equations used in the experiment.
  - Your writeup should demonstrate that you understand the concepts. You should derive equations, show how they relate to each other, etc.
  - Try to do more than just regurgitate from the manual. The manuals are an ok place to start but they're usually pretty light on detail. You should do your own reading/research. This semester I'll also try and post some resources for further reading.
- **Experiment setup: (2 points):**
  - A description of the experiment.
  - The goals, the variables you measured, the instruments used, the assumptions you made.
  - Diagrams are good.
- **Presentation of data: (1-2 points):**
  - Clear presentation of data.
  - This includes tables, graphs, equations, 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 an 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 a table in your report without labeling what it contains and what experiment it corresponds to, my initial reaction will probably be one of bafflement, not understanding.
- **Analysis, discussion: (2-3 points):**
  - A discussion of your results. You should explain what they show, how they demonstrate the theory, etc.
  - If applicable, compare your experimental values to the theoretical ones. Why are they different?
  - You should answer the questions in the manual (marked in bold). It's up to you whether you integrate your answers into your general discussion, or if you answer them separately.
- **Sources of error: (2 points):**
  - A discussion of factors that may have caused imprecisions/inaccuracies in the results.
  - Your sources of error should be relevant. 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.
  - It's also worth noting 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 and suggest improvements.
- **Bibliography/references:**
  - I won't grade this, but if you use external sources (as indeed you should) you should state them.

## Don't Worry Too Much 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:** as long as I can basically follow what you're saying, we won't have trouble.

## 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 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 to use software to do these calculations (for your own sake). If you don't know how, feel free to ask me. I will give you some code that helps speed things up for you. I want you to spend more time on analysis and building understanding than on repeating menial calculations!

## 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.