

# Physics 2232 Lab Report Template

You

December 8, 2025

## 1 Delete before submission: General Guidelines

- Disclose all LLM use. Avoid using LLMs to write the entirety of your report, as it will hinder your learning, but feel free to use them for editing suggestions.
- Use proper grammar and try to keep your sentences concise. Try to keep a logical train throughout the paper, and avoid sudden topical jumps
- Human error is not interesting. Do not mention it. If errors are caused by measurement imprecision, try to determine exactly how imprecise the measuring tool is.
- Do not write in an overly familiar way. If you want to make a funny comment, make a footnote.<sup>1</sup>
- Respond to all questions posed in the "experiments" section of the relevant lab on the website.

## 2 Introduction

Your introduction goes here! A well-written introduction should fully contextualize the work, preparing the reader for the rest of the paper. Here are a few key elements that must be included in an introduction:

1. Physics background. This includes things like key equations and underlying physical laws. For publishable papers, a few paragraphs discussing previous work and research gaps are necessary. For the purposes of this lab, stick to 1-2 sentences of historical context. This should transition easily into the prelab, which should be attached to the report (either TeX-ed here, or screenshotted). Here is an example of an equation:

$$\mathbf{F}_{EM} = q(\mathbf{E} + \mathbf{v} \times \mathbf{B}) \quad (1)$$

2. Prelab. (self-explanatory?)
3. Underlying research question. Why should we care about the work that you've done for the lab? This is typically a few sentences that serve to link the description of the lab work with the physics background.
4. Overarching goal of the lab. This should be a few sentences, and it should describe what you're planning to measure/test. It should also give the reader a sense of why you're doing what you're doing (significance). If done right, it should allow for a smooth transition into the methods section.

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<sup>1</sup>I appreciate humor! However, the purpose of this course is to develop your ability to clearly communicate your ideas in a scientific context. If you have an entertaining or interesting anecdote, feel free to share it here. Just don't interrupt the narrative with musings like "I wonder what would happen if we threw the magnet at 0.1c..." or "We're very terrible at experiments, so sorry"

## 3 Methods

Here, you will describe how you did your experiments. This section does not need to be too detailed (i.e., I do not need to know the exact specifications of every single piece of lab equipment used). It should give the reader enough information that they would be able to recreate the experiment given the same equipment. You are allowed to refer to the website to cut down on the writing here.

### 3.1 (Part 1)

It might be a good idea to split the methods section into parts, corresponding to different experiments.

## 4 Results

In this section, you should discuss your experimental results. You have a lot of freedom to structure this section how you would like - for example, you can include analysis after each section, or you can present all the results in one section and all the analysis in another. I slightly prefer the former, but I will not take off any points for structure as long as the story is cohesive (i.e. please do not present experiments out of order unless it makes sense to do so).

Results should be presented clearly. For any calculated values that you include in the report, either reference an equation in the introduction (e.g. Eq. 1) or the methods section. Ensure that you include a sample calculation. If your results rely on statistics from IO-Lab, include a properly cropped screenshot of an example result from the IO-lab UI. Please do not list results in bullet point form, as this disrupts the narrative. If you want to summarize a lot of results, use a table (see 4.2) and refer to table elements in the analysis.

### 4.1 Images

I'm using this section to give you information on adding figures. A figure should always have a caption. If it is a graph, all axes should be labeled, and there should be a title. If there are multiple datasets on the same graph, you need to include a legend. All graphs should be readable! If the quality is low, the reader will not get very much out of them. Here are instructions for adding figures to LaTeX, taken directly from the LaTeX example file:

First you have to upload the image file from your computer using the upload link in the file-tree menu. Then use the `includegraphics` command to include it in your document. Use the `figure` environment and the `caption` command to add a number and a caption to your figure. See the code for Figure 1 in this section for an example.

Note that your figure will automatically be placed in the most appropriate place for it, given the surrounding text and taking into account other figures or tables that may be close by. You can find out more about adding images to your documents in this help article on [including images on Overleaf](#).

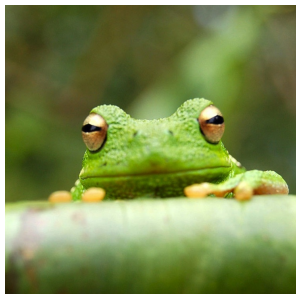


Figure 1: This frog was uploaded via the file-tree menu.

Note: if you do not add `[!htb]` after a figure, it may go to a random location in the document that does not correspond to the section you intended. This can make reports a bit confusing to read.

## 4.2 How to add Tables

Use the table and tabular environments for basic tables — see Table 1, for example. For more information, please see this help article on [tables](#).

Item	Quantity
Widgets	42
Gadgets	13

Table 1: An example table.

## 4.3 How to add Lists

You can make lists with automatic numbering ...

1. Like this,
2. and like this.

...or bullet points ...

- Like this,
- and like this.

## 5 Analysis

This is not strictly required as a separate section (see 4). However, you should always include the analysis *somewhere*. Good analysis has a few key elements:

1. Includes obvious aspects of the results. Even if you can look at a number and immediately see that it is bigger than another, mention that explicitly in the analysis.
2. Connects results to the objectives of the lab listed in the introduction.
3. Describes in detail the implications of the results - i.e., does the model adequately describe reality?
4. Goes the extra mile. If you can think of any insight that is not obvious, mention it! It is much more interesting for me to read, and it may give you extra credit if I think it demonstrates a mastery of the content. This is the most difficult thing to include when writing anything, as it requires creativity.
5. Discusses sources of error relevant to particular experiments. For instance, did your model not account for boundary conditions? Were there places where energy loss could have occurred, or where symmetry was assumed when there wasn't perfect symmetry?

## 6 Conclusion/Discussion

For this lab, the conclusion does not need to be more than a few paragraphs. It should include:

1. A summary of the report. What were the main objectives and findings?
2. A summary of the sources of error. Where did the findings deviate the most from the models presented? Where did this deviation come from?
3. A discussion of the importance of the lab. How does this connect to other topics in physics, or outside of physics? Why should we care about the experiments?
4. A suggestion of further improvements or interesting future experiments. This is your chance to show a little bit of creativity.

## 6.1 How to add Citations and a References List

You can simply upload a `.bib` file containing your BibTeX entries, created with a tool such as JabRef. You can then cite entries from it, like this: [Gre93]. Just remember to specify a bibliography style, as well as the filename of the `.bib`. You can find a [video tutorial here](#) to learn more about BibTeX.

If you have an [upgraded account](#), you can also import your Mendeley or Zotero library directly as a `.bib` file, via the upload menu in the file-tree.

## 6.2 Challenge Problems

Respond to the challenge problems in detail to receive full credit. Answers that are poorly explained but correct (i.e. bad handwriting, missing logic, major typos) will receive partial credit (30-90%). Answers that are just a number/expression with no explanation will receive 0 credit.

For challenge problems based entirely on lab results (not extensive derivations), I will give credit even if the lab is turned in late. I will not give credit for derivation/problem-based challenge problems turned in more than half a day late.

Advice for solving challenge problems:

- Look at relevant homework/textbook problems
- Go back to basics - if a seemingly relevant technique is based on a more fundamental principle, sometimes you might need to apply the fundamental principle instead.
- Don't spend too much time on the challenge problems! Developing your writing is much more important for the purposes of this course. You'll have plenty of opportunities to tackle hard problems in the future.
- Ask me for hints! I am very willing to give hints on challenge problems.

## References

[Gre93] George D. Greenwade. The Comprehensive Tex Archive Network (CTAN). *TUGBoat*, 14(3):342–351, 1993.