Writing for Intermediate Lab

General
All submissions must be files in Microsoft Word format.

Double space everything. Actually, you usually have to do this for initial submissions of journal articles. The idea is to leave space for comments.

Start paragraphs with indents, not extra vertical space. In technical writing, displayed equations also introduce vertical space, so that it cannot unambiguously indicate a new paragraph. Indented paragraphs are unambiguous. (Refinement: The first paragraph after a heading does not need to be indented.)

Your full paper must be no more than 10 pages long, including all parts. This does not in any way indicate that 10 pages are required: many excellent reports are shorter. It is never required for any section to start on a new page, although section titles should not get separated from the following text.

Neither an Acknowledgements section nor Appendices are likely to be appropriate for the papers written in this class.

Title Block
You should not use a title page. That never happens in a journal article.

Title
Note that the words that we use to describe the various experiments in this course are very abbreviated, for convenience. As in, “This week you’ll do the Hall Effect experiment.” These same words would not make a suitable title for your paper. A title needs to be more informative, such as, Using the Hall Effect to Measure the Carrier Density of Copper.

Author List
In this course, we sometimes have different students writing different sections. List the writers in the order that their sections first appear. Anyone who worked on the experiment but did not contribute to the writing should be listed after the writers. The course instructor should not be included.

Dates
You may simply skip the dates in the title block. This is as if you are preparing a manuscript for submission.

Abstract
Note that the things you wrote for Analytical Physics I and II at Geneseo were very likely not appropriate as abstracts for journal articles. They may have been called Abstracts, but they might more properly be described as Brief Reports, providing more detail about the experiment than a journal article abstract needs.

Body
You should write for an audience of junior-level college physics students. Thus, anything commonly covered in a first-year college physics course would probably not need to be repeated. However, something from sophomore year might need a quick review; not everybody understands everything after one semester, and reading it again certainly won’t hurt.
Write in the style where the Body is split into sections with titles. Specific sections may be assigned to specific individuals. You may adjust the titles of those sections if appropriate; just don’t violate the spirit of the division of labor.

MS Word displayed equations will not be full-sized if there is any other text in that line, including equation numbers. The best solution is to put displayed equations in a full-width single-row table. Equations in a table cell are full-sized, and the equation number can go in another cell.

In MS Word equations, note that it is sometimes necessary to type the space bar in order to activate some types of formatting, such as sizing parentheses to their contents.

**Introduction**

Most labs in this class have a close relationship to some historical experiment or result. In those cases, making that connection in the Introduction is required.

**Equipment & Methods section**

Keep in mind:

- A list of equipment is not appropriate. Use text to describe the function of each equipment piece.
- Minor pieces of equipment should not be detailed. The reader does not need to know whether you used duct tape or packing tape.
- This is not a “Procedures” section. The “Methods” part of the section title indicates that you tell how the equipment functions, but not a step-by-step procedure you followed. This is possibly a fine distinction; ask me about it if you aren’t sure.

**Theory**

DO NOT include theory that is not used for the experiment. DO include background required for data analysis calculations.

**Analysis & Results**

This is where initial data should appear, as well as final results. This should include a discussion of the calculations required to get the results from the data. General physical relationships may have been covered in Theory, but equations specific to your experiment would be developed here.

**Figures and Tables**

Use of photographs requires prior permission from the instructor, and will rarely be allowed. A line-drawing schematic is nearly always a more effective choice. The drawing facilities in Microsoft Word are quite good, but if you prefer a hand-drawn and scanned image, that is fine too. I do not expect you to spend hours creating a work of art.

You may reuse Figures and Tables from other sources without getting permission from the author. However, you must modify them if they contain aspects that are inappropriate for your paper. You must write your own captions, which must include a reference to a citation for the original source.

Color should be avoided, but if a figure from another source already has color, you need not remove it.

Look for places where multiple figures can be combined, especially when you include multiple similar graphs which might be plotted on the same axes. In many cases, this will improve the figures
by facilitating comparison between the things presented. It will also help if you are approaching the 10 page limit.

Include all Figures and Tables in-line with the text near where they are first referred to by the text. You need not get picky about exactly where the figure lands on the page. However the caption should be placed appropriately (below Figures or above Tables), and the caption should be clearly separate from the body text (smaller font can do this nicely).

When different students write different sections, it is often the case that someone writing one section will want to refer to a figure in a different section. Cooperate to make this work smoothly.

**Reference List**

The use of Microsoft Word’s system for adding endnotes can be very helpful to you, including automatically re-numbering them when you merge writing from several authors.

For this course, you get a special dispensation for some web page citations. This is because (1) you have limited time to complete the labs, so you can’t always do a proper literature search, and (2) web pages will most likely not disappear before the end of the semester. Two kinds of web citations are allowed, corporate and identifiable individual.

- If a company or similar large organization (national lab, university, scientific organization, even a web-based educational organization) has published something on the web, then that is fair game. Such large organizations are more reliable than individuals because their business and/or existence is on the line, and usually they have published the same information on paper (which you would track down and reference if you were submitting your paper to a journal).

- Web pages by individuals may be referenced if you can give the author’s name and institutional affiliation. If you can’t get that information, then you need to find another source to reference.

If you want to put a citation in a caption or on a specific entry in a table, number that citation however you like.

For this class, please do include the titles of journal articles in your references, putting them right after the author names. Otherwise, use standard a bibliographic format for your references. For web citations only (for which there is no standard), use the format

[5] Author Names, Company or Organization Name, *Title*, full URL.

Note that the full URL is required, not just the web server’s Internet address. I should be able to type the URL into my web browser, and immediately see the information that you used.

**Check List**

Here’s a checklist you can use to make sure that you aren’t making some of the most common mistakes.

- All equations are justified by one of these three reasons: obvious (Analyt III level or simpler), derived from previous equations in paper (which ones should be mentioned), or reference to a citation.

- Equations justified by reference to a citation should still have a qualitative description of the concepts and assumptions behind their derivation.
- All Figures should have captions; not just “Figure #”, but a sentence or two of descriptive caption.
- Some idea of reliability of result is given, preferably numerically.
- Major sources of uncertainty are identified. Uncertainty is not error.
- Abstract makes clear what the focus of the paper is.
- In the Introduction of the Body, there is an explanation of why the subject of study is important/useful. If the reason is just “it’s interesting,” include some historical background justifying that (e.g., demonstrating that other people have thought so too).
- All results from your work that are mentioned in the Conclusion section are also mentioned before that. This includes uncertainties, problems encountered, etc. Speculation or suggestions in the Conclusion need not have appeared before.