

***Dr. Damm's Guidelines for Presentation of Experimental Results***  
***Note: These are not my "rules." These are generally accepted conventions for presenting engineering and scientific results.***

### **Format of Figures**

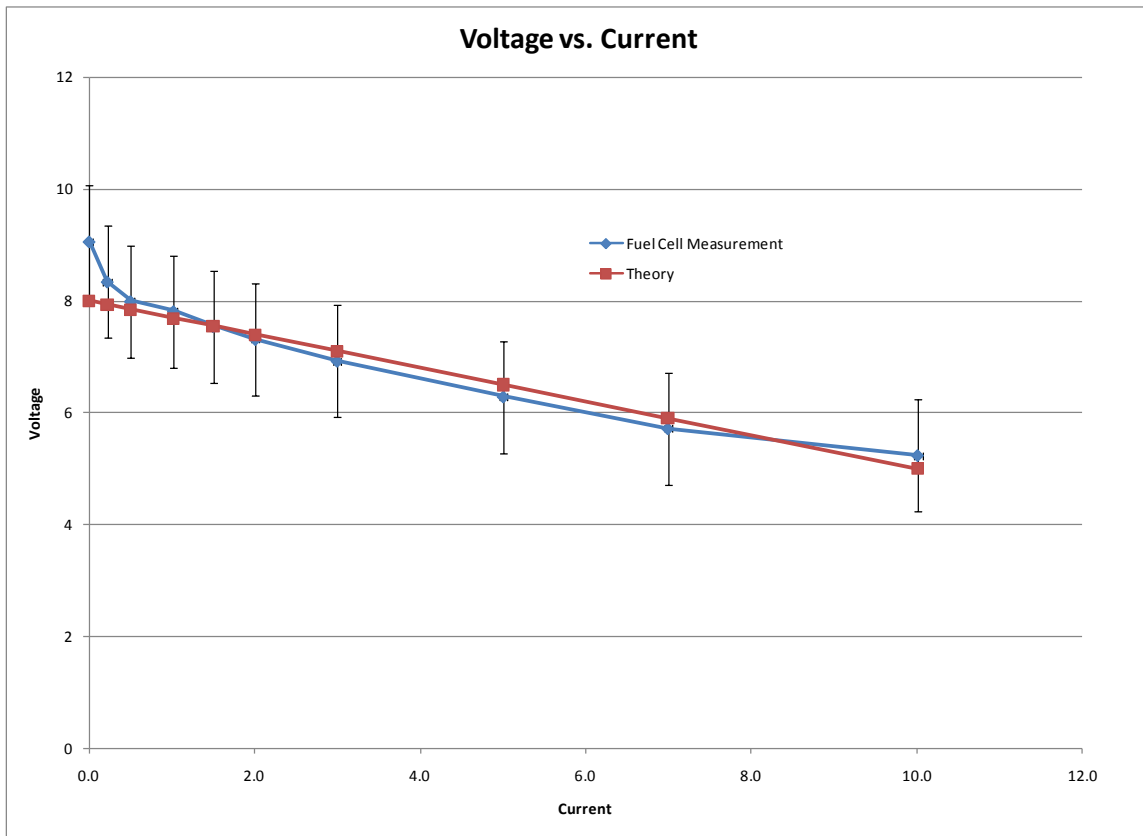
1. Graphs should have figure numbers (Arabic numerals, Figure 1, 2, etc.) and a figure title shown BELOW the graph. There should not be a redundant title above the graph (thus when generating graphs in Excel, the title area should be left blank).
2. Figure titles should provide some meaningful information that cannot be gleaned by simply looking at the figure. Therefore, a title like "y vs. x" for a plot of y vs. x is not acceptable. Anyone looking at the plot can see that it is a plot of y vs. x. More information is generally better, but titles should not be multiple sentences long.
3. The axes should be labeled with the corresponding units in parentheses.
4. When plotting measured data points, the data points should be shown and should not be connected by lines. (select "marker" and "no line" in the format data series in Excel).
5. When plotting modeled data or a theory, the generated data should not include markers and should be connected by a line (select "no marker" and "line" in the format data series in Excel). Also, use a fine enough x-axis discretization (small step size for independent variable so that curved theory functions are smooth).
6. Generally, an attempt to quantify experimental uncertainty or model/theory uncertainty should be made either by 1<sup>st</sup> order multivariate error propagation or by statistical techniques. Error bars should be used on both the measured data and the modeled/theoretical results. The error bars for modeled/theoretical results should be displayed as dashed lines.
7. If error bars are too small to see on the graph AND they are the same for each x or y value, the uncertainty can be shown on the axis label (e.g. length (inches +/- 0.125)). If the error bars are too small to see but vary from point to point, you can use data labels showing the error or paste a table of uncertainties directly on the plot. The key point is that the uncertainty is effectively communicated on the plot.

**NOTE: When doing professional experimental work, experimental uncertainty should ALWAYS be quantified.** Realistically, in certain situations there may not be time and/or money to fully quantify the experimental uncertainty.

When making decisions about how to present data graphically, keep the reader in mind. Try to be as concise as possible (e.g. putting several sets of data on the same plot) while not overwhelming the reader with too much information on one graph to allow for easy interpretation. There are no set rules in this regard. It is somewhat of an art. Rule of thumb → if it is hard for you to read, it will be VERY hard for the reader to properly interpret.

Keep in mind that for technical/professional papers that will be published, people are likely to make or print black-and-white copies of the paper. Thus, figures should not depend on color to be properly interpreted.

I've included an example figure that has many problems with it. **Can you find the problems?**



### Format of Tables

Tables should be numbered with Roman numerals (Table I, II, III, etc.) and the number along with the title should appear ABOVE the table.

### General Comments

Avoid statements of value and general opinion in your reports (e.g. “The experiment was a success.” “This was a good experiment.”) Stick to the facts (the results) and your interpretation of the results.

Generally, it is better to paste the figure into the text, near the point in the text where the figure is being discussed (never include a figure or table in a report without referring to it and discussing it in the text). You should not present all of the figures together and then have a discussion of the figures several pages later in the report, requiring the reader to flip back and forth to follow the discussion.

If a figure is copied from another source (e.g. the internet) and pasted into your report, legally it should be changed (even slightly) and then it should read “(adapted from reference \_\_\_)” at the end of the figure title.