Lab Report Guidelines

Each lab has specific requirements given in the lab procedure. The lab report should address the specific requirements, and follow the general guidelines described here.

A lab report should have the following format:

Title page with the lab title, student names and date

1. **Introduction and Objectives**
2. **Methods and Results**
3. **Discussion and Conclusions**

The **Introduction and Objectives** section should include a brief description of the lab, and a summary of the purpose and content of the lab, *in your own words*.

The **Methods and Results** section is the main part of the lab report. The experiments should be described in sufficient detail so that another engineer reading the report would be able to repeat your work. Specifically, for each Task in the laboratory include all of the components that apply to the Task:

a) Reference to the Lab Task, e.g. "Lab 1, part A.1.1. Square Wave"
b) Any/all relevant analysis and simulation results
c) Detailed circuit diagrams of experimental circuits *annotated with relevant signal names, component names and values*. You may use LTspice, Altium, or any other software of your choice to produce circuit diagrams.
d) Relevant equipment setup data: a brief description of which piece of equipment was used and how.
e) Experimental results:
    i. Scope waveforms (screenshots) should be annotated/labeled with signal names matching the signal names in the schematics, and scales (volts/div, and seconds/div), as well as measured important features of the waveform (such as peak value, peak-to-peak value, time delay, etc.)
    ii. Numerical results (you may use Excel) should be presented in graphical format, with clearly labeled axes and important features of the plots. A table of measurement data should be included in an Appendix at the end of the report.
    iii. Calculations, data analysis, comparisons to simulation results, and comments related to the experimental results. Each plot or graph in the report should have a title or caption that clearly specifies what is shown in the figure. It is not sufficient to give references to parts of the lab procedure. For example, do not just say "Lab 1, part A.1.1"; give a full caption: "Square-wave voltage waveform generated by Agilent 33521A waveform generator: minimum value is $V_{min} = 0$ V, maximum value is $V_{max} = 2$ V, frequency $f = 1$ kHz, duty-cycle D $= 50\%$"

The **Discussion and Conclusions** section should be a brief summary of the lab results. Have the lab objectives been met? What conclusions can you draw? What are the limitations of the experiments? What have you learned from the lab? Give suggestions on how the lab could be

improved or what other experiments could follow. Also, be sure to answer any specific discussion questions asked in the Tasks of the lab itself.

In general, in all sections of the lab report, be neat, **brief and precise**. Quality is much preferred to quantity. Your audience is fellow engineers and you do not want to waste their time with irrelevant data, verbose statements, or incomplete schematics. You will be graded on content, clarity, completeness, and correctness.

Messy reports will be returned without grading and will receive zero credit.
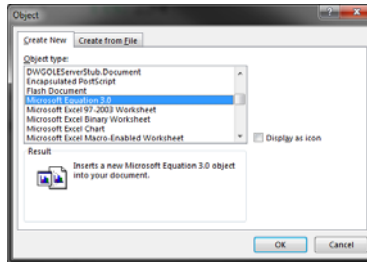
General Tips For Technical Writing

Below are some tips for paper formatting. Though not an emphasis in this course, reports should try to conform to these.

1. Do not report significantly more digits than is necessary to convey a point with numerical results. Use metric prefixes rather than scientific notation where possible.
    - **No:** 234.234652345   **Yes:** 234
    - **No:** 2.2345 e-6 A   **Yes:** 2.2 μA
    - **No:** 100000000   **Yes:** 100,000,000 or 100k
2. Use subscript and superscript for variable names. Italicize all letters in variable names, but not numbers, known functions, or punctuation.
    - **No:** va1   **Yes:** v_{a1}
    - **No:** Ix^3   **Yes:** I_x^3
    - **No:** rds(on)   **Yes:** $r_{ds(on)}$
    - **No:** *Sin(x)*   **Yes:** $\sin(x)$
3. If using Microsoft Word, use Microsoft Equation Editor for equations too complex to fit in-line. Fig. 1 shows where to find both Equation Editor 3.0 and the new Equation Tool in the Word toolbar.

(a)

(b)

Figure 1: (a) toolbar locations of object and equation commands and (b) location of Equation Editor 3.0 in the object menu.

4. As above, reference figures as "Fig. 1" in the text. This is IEEE format.
5. Number any equations which are referenced in the text. This can be easily formatted using tab stops, as shown below
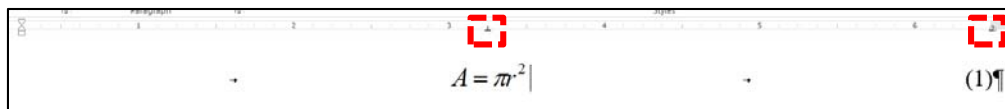
$$A = \pi r^2 \tag{1}$$

Figure 2: Screenshot showing tab stops to obtain formatting in (1)

6.