Lab Report Structure and Formatting

Lab reports are the primary source of documentation for the experiments you will be performing. The goal of the lab report is to clearly and concisely convey what you did in order to successfully complete the assigned experiment. You should be writing your reports so that someone of approximately the same skill level as you would be able to understand what you did, how you did it, and why it matters.

The Basics

The first thing your report needs is a header. The specific header contents and style varies by audience. For our courses, place your name, your section number, the lab number, the lab name, and the date at the top of every page. A list of equipment used should also be included after the abstract and before the content. Page numbers in the footer or header are also strongly recommended so that reviewers can give more specific feedback. Page numbers also help with identifying if printed reports are missing pages.

Every section of your report should have a heading. The easiest solution is to use the premade formatting options in your text editor. As you progress into sections and subsections, use progressively smaller headings to show hierarchy. Good document organization makes reading and understanding the report much easier (it also makes your grader, boss, or reviewer happier!).

Figures should be labeled with a figure number and referred to as such when referenced in your report text. Additionally, you should pick a citation format and use it to cite any references used to help with writing the lab. The IEEE citation style is easy to use and is recommended for ECE related technical reports.

Elements of the report

There are elements we ask that you complete for your report: abstract, objective, procedure, results, and conclusion. You should include *one* abstract for your entire report, but each task in your report should have an objective, procedure, results, and conclusion.

Abstract

An abstract is a short 1-2 paragraph summary of the work done in the report. It is designed to give readers an idea of the work done within the report so they can decide if the remainder of the document is worth reading. For that reason, the abstract should be understandable without reading any other portions of the document. In general, an abstract should answer the following questions:

- What was the purpose of the experiments?
- What methods were used to perform the experiments?
- What were the primary findings of the experiment?
- Why was the experiment useful/important?

The content in the abstract should follow the same order as the content in the report as a whole and should not introduce any new ideas not addressed within the report. Abstracts are usually written last in order to ensure that these guidelines are met and that the abstract accurately summarizes all of the work.

Objective

The objective for each section should be 1-2 sentences that describes the overall goals of each task within the lab. To that end, an objective should describe a technical goal, not a "learning" goal. While our goal with the labs is for you to learn, the objective should describe what the experiment is trying to show. For example, the following objective statement is **not** what we are looking for.

Wrong: *The objective of this task is to learn how to use the multimeter*.

Instead, write the objective to describe what will be done in the lab.

Better: *This section will demonstrate the voltage and current measurement features of the multimeter.*

Procedure

The procedure section should be a list of actions needed to accomplish the task. It is **not** the same as the procedures listed in the lab manual. **The easiest way to complete the procedures section is to record what you are doing as you do it during lab.** That way, with some minor formatting cleanup, you don't need to do any additional work to write your procedure.

Another key part of the procedure is circuit diagrams. If you build a circuit for an experiment, a circuit diagram must be included. A **carefully and neatly** hand drawn and **scanned** (not photographed) diagram is usually sufficient for a normal report; however, formal reports and reports you do for professional work in the future should include electronically generated schematics. There are numerous tools for drawing schematics including, but not limited to, Visio, LTSpice, KiCad EESchema, Circuitikz, and Draw.io. We recommend picking one you feel comfortable with and learning to use it well.

The circuit diagrams in your report should not be direct copies from the lab manual. **Copying circuit diagrams from the manual and other sources is a form of plagiarism and will be treated as such.**

Results/Calculations

The results section of the manual contains all of the measurement data as well as the answers to any questions posed in the lab manual. This section should also contain any calculations necessary for the design of the circuits built in the experiment. While this section tends to consume the most amount of space, it usually is the easiest to assemble because it is only recorded data and calculations. Within this section, you should strive to typeset your equations using the built in equation editor in your word processor; however, you may hand write and scan derivations for normal reports.

Where possible, the results section should include error calculations for measurements.

Conclusions

The conclusions section should use the results to identify whether or not an experiment was successful. It should explain the key findings of the experiment. The conclusion should also explain or attempt to explain the potential sources of error in the experiment, especially when the percent error is high.

Types of Reports

Within this course, we will have 2 types of report: full writeup, and formal report. All reports must be original work and demonstrate that you accomplished the lab.

Full Writeup

- Contains an abstract

- Has an objective, procedures, results/calculations, and conclusion section for each task

- Includes hand drawn and scanned or electronically drawn schematics of any circuits built

- Answers all questions in the lab text

Formal Report

- Contains an abstract

- Contains an introduction that gives an overview of the what the problem is and a brief overview of the solution

- Contains a theory section that explains how the system and its parts work and derives the equations used in the Calculations section.

- Has an objective, procedures**,** design calculations, and conclusion section for each task

- The results/calculations should reference derivations in the theory section where appropriate

- Has **only** electronically drawn schematics and typed equations.

- Answers all questions in the lab text