How to write an electrical engineering lab report

Dr. John D. Lynch
School of Engineering and Computer Science

Support for this work was provided by the National Science Foundation through grant number DUE #1505066. The opinions expressed are those of the authors and not necessarily those of the National Science Foundation.

Remember English 101?

- WPA (Writing Program Administrators) Outcomes
  - Rhetorical Knowledge
    - Ability to analyze contexts and audiences
  - Critical Thinking, Reading, and Composing
    - Ability to analyze, synthesize, interpret, and evaluate ideas, information, and text
  - Knowledge of Conventions
    - Conventions are the formal rules and informal guidelines that define genres
- Your audience: peers in electrical engineering (not necessarily your instructor, TA, or classmates

How to transfer that knowledge to writing an engineering lab report

- Engineering Lab Report Format
  - Intro: So What? In
  - Body:
    - Procedures or Methods of Approach: concise, reproducible
    - Results and Discussions: present your findings and discuss them
  - Conclusion: So What? Out
- Findings based
- Three patterns in paragraphs
  - Claims (experimental finding)
  - Evidence (experimental data, estimated data, reference data, theories from the references, etc.)
  - Analysis (quantitative, qualitative)

Before/during the lab

- Read the lab handout first
- Review the relevant textbook chapter
- Think of what you are interested in learning from the lab
- Follow the standard lab safety procedures
- Do your best to collect data accurately
- Take screenshots or photographs when you observe something interesting or important
- It's OK to go "off the script" to explore circuit/system behavior beyond the parameters of the lab manual or lab write-up. In your lab report, describe what you did and what you learned

Lab Report Cover Sheet

- A cover page listing ABET objectives is provided for each lab
- Please attach the cover page to the front of your report
- Each team turns in **one** lab report
- Make sure **all team member's names** are listed on the cover sheet.

Lab Experiment 2: Voltage, Current and Power* **ECE 260 - Lynch**

*Antoch, *Experiments with Electric Circuits*, Zap Studio, 2010, ISBN 978-1-935422-11-2

Names: _____

_____

Writing (40 points total)	**Course outcome**	**Grade**	
Rhetorical Knowledge	B-3	/10	
Organization and Content	B-3	/10	
Critical Thinking and Evidence	B-3	/10	
Conventions	B-3	/10	
	Writing Total	/40	/40
Required by Lab Manual (40 points total)	**Course outcome**	**Grade**	
Part 1	B-3	/10	
Part 2	B-3	/10	
Analysis	B-3	/10	
	Report Total	/30	/30
	Total		**/70**

B-3. Use appropriate tools to analyze experimental data.

How to write a lab report

Every lab report must consist of:

1. **Title / Cover Sheet**: use the provided cover sheet. If the cover sheet already has a title then use it as is. If not then add a title. The title should indicate what the lab report is about. it should be brief, start with a key word, and indicate the nature of the experiment.
2. **Introduction / Purpose**: in one paragraph, explain the objectives, or purpose of the experiment. In one clear sentence, state your hypothesis (if any). Explain *what and why* you are doing the experiment (So what? In)
3. **Instruments / Materials**: a complete list of everything you needed to complete your experiment

How to write a lab report (2)

4. **Methods**: a detailed narrative describing the steps you completed during the lab. It is your **procedure**. Any random person should be able to read this section and duplicate your experiment. *Write it as if you are writing instructions for someone else to complete the lab*.
5. **Results**: organize and summarize the data generated by your experiment. You should discuss your data table *in words*.
6. **Data Tables**: a data table is often used to represent the results of an experiment. Any numbers entered into the data table must be complete *with units*. Your table must also be labeled with a descriptive title.
7. **Figures & Graphs**: graphs and figures must both be labeled with a descriptive title. *Both axes on a graph must be labeled with specific units of measure*. The independent variable should always be recorded on the X-axis. The dependent variable is recorded on the Y-axis.

How to write a lab report (3)

8. **Discussion / Analysis**: discuss and interpret the results of your experiment. It is important to reflect back on your hypothesis in this section - Can you support your hypothesis? Must you reject it? Also, use this section to discuss any mistakes you may have made while performing the experiment. If your data is "weird" try to figure out where you went wrong. Finally, suggest how the experiment might have been improved.
9. **Conclusion**: this should be one good paragraph summarizing the results. Answer the following questions in the conclusion section:
   a. What does your data tell you about the experiment?
   b. What happened in the experiment?
   c. What did you learn from completing this experiment?

Lab Report Grading Rubric

- Rhetorical Knowledge: adapt to the appropriate purpose, audience and context

	4.0 Exceeds expectations (~100%)	3.0 Meets expectations (~85%)	2.0 Needs improvement (~70%)	1.0 Far Below Expectations (~55%)
Overall, the writer's style is appropriate to the task, purpose, context and audience				

Lab Report Grading Rubric (2)

- Organization and Content: Developing ideas in a sophisticated logical sequence.

	4.0 Exceeds expectations (~100%)	3.0 Meets expectations (~85%)	2.0 Needs improvement (~70%)	1.0 Far Below Expectations (~55%)
Articulates a clear hypothesis and establishes a clear connection between that hypothesis and the experiment's purpose				
Provides background information and theory from appropriate and authoritative sources related to the experimental hypothesis.				
Includes well-defined and concise descriptions of experimental procedures.				
Provides accurate and comprehensive analysis and interpretation of data and concepts at hand.				
Effectively summarizes cause/effect relationships and conceptual connections related to findings.				

Lab Report Grading Rubric (3)

- Thinking Critically and Providing Evidence: Ability to analyze, synthesize, interpret, and evaluate ideas, information, and text

	4.0 Exceeds expectations (~100%)	3.0 Meets expectations (~85%)	2.0 Needs improvement (~70%)	1.0 Far Below Expectations (~55%)
Provides evidence that is accurate and credible.				
Employs statistical, analytical, numerical, visual and observational data to support analysis (including data tables, calculations, PSpice simulations, graphs, etc.)				
Establishes clear connections between the proposed hypothesis and experimental data by actively analyzing, synthesizing, and drawing conclusions based on experimental data.				

Lab Report Grading Rubric (4)

- Conventions: The formal rules and informal guidelines that define genres

	4.0 Exceeds expectations (~100%)	3.0 Meets expectations (~85%)	2.0 Needs improvement (~70%)	1.0 Far Below Expectations (~55%)
Presents sections and subsections appropriately titled, labeled and formatted.				
Includes references and citations, properly placed and accurately cited (according to the format requested by instructor).				
Labels figures, tables, graphs, and calculations in an accurate and meaningful fashion.				
Employs appropriate language, style, tone, and voice throughout the lab report.				
Makes minor and infrequent errors in grammar, sentence structure, and mechanics.				