

1 Purpose and Audience

Technical writing is an important skill to develop for a career in science and engineering, whether in academia or in industry. Effective technical writing communicates information clearly. With that in mind, it is important to consider the information you are aiming to convey and the audience for whom the document is intended. A quick start guide for a consumer electronics device, a conference publication on sensor design, and the data sheet for an electronic component are all examples of technical writing, but they convey different information to audiences with different background knowledge.

What is the purpose of a lab report? A lab report should clearly document what the goals, methods, and results of the work were and present a discussion//interpretation of the results (much like an academic research paper). In some regards, the documentation is the most important part of the work. In academia the saying goes, “if it’s not published, it didn’t happen”. Similarly, imagine trying to use a device or code library with no provided documentation, practically useless.

Who is the audience of the lab report? Generally, your professor or AI will be grading the lab report, but you should write for a less informed audience. Write the lab report as if you were writing for a student a year behind you (or for yourself a semester or two ago). This audience has some technical background (*e.g.*, you don’t have to explain that you used Numpy to do math), but hasn’t yet learned about the specific topic of the laboratory exercise (*e.g.*, numerical integration, multi-link bodies, feedback control etc).

2 Organization

Sections of a Lab Report

Lab reports should comprise the following sections with each section clearly labeled (excluding *Header and Title*).

Header and Title. At the top of the lab report, include your name and any collaborators’ names, the date, and the course number for the course. A lab report should have a descriptive title; typically, the title will be the same as that on the lab assignment, but feel free to change it.

Introduction. Introductions introduce *and* summarize. In 1-2 paragraphs, lay out the topic and objectives of the lab, introduce any new terminology and explain new concepts, then summarize the work and the major findings.

Material and Methods. In this section, outline the procedures used with enough detail that somebody else could replicate your work (again, consider your audience). In physical labs, you should list the equipment and the procedure used to perform the experiment and analyze the data. In this section, you should present any new equations, models, schematics, code snippets, that help communicate how the work was done.

Results. Results are matter of fact, in that they should not include interpretation of the data. For each result, you should briefly reiterate which experiment/question the result addresses and

present the relevant data and analyses. Results should all be summarized in text, but you will often (almost always) report data in some other more digestible form (*e.g.*, a figure or a table).

Discussion and Conclusions. To conclude, you will interpret your results, explaining the significance of the data and analyses you presented in *Results*. If there are questions specifically asked in the lab assignment, those should be addressed here. If your results were unexpected or your lab work was unsuccessful, explain what you suspect the problems to be and how these issues might be avoided or improved. Also discuss any limitations, assumptions, or caveats to the work.

Citations. If you have used pertinent external reference materials (including websites), they should be cited in the text and a bibliography included at the end of the report.

3 Tips and Advice

Some other tips to consider while writing:

Figures, Lists, Equations, Schematics, Code Snippets, and Tables can be useful ways to communicate ideas or results that might be difficult to summarize in words. The goal is clarity and accessibility; consider how information could be conveyed most clearly. Figures and tables should have brief explanatory captions and include titles, labeled axes, and legends as necessary. Information presented in the figures, tables, and text should not be redundant, though you should summarize the content of a table or figure in the text.

Writing style should be clear and concise. Again consider your audience. Technical writing shouldn't sound robotic. The goal is to communicate information clearly, not to sound smart (being clear will read as smart).

- Try to use active voice and descriptive verbs when possible.
- In *Results* and *Discussion and Conclusions* sections, write in present tense. Data live in the now. For *Materials and Methods*, you may write in past tense.
- Avoid long words when simpler words will do (*e.g.*, use 'use' instead of 'utilize' or 'employ').
- Avoid jargon unless you know your audience will understand it or you've defined it earlier in the report. Jargon is a concise way of communicating within a knowledgeable group. But to those unfamiliar, jargon is confusing.
- Check your writing for correct spelling and grammar. Read your work aloud or have a classmate proofread.