

## Understanding the Sections of a Lab Report

- **Remember:** The expectations of different professors, classes, and academic disciplines vary; double check with your professor, lab TA, pre-lab and lab manual instructions, and/or course syllabi for specific guidance.
- For each section, **ask:** What is the purpose of this section? What information is necessary, how should I display that information, and how does that information contribute to an overall understanding of the experiment or study?

### Abstract

The abstract summarizes the Introduction, Materials and Methods, the Results, the Discussion, and the Conclusion in one paragraph of 4-6 sentences. The abstract may be easier to write if you write it last, because it is often easier to summarize something that you have already written. (Or, you may want to write a draft abstract, move on and write the remainder of your lab report, and then revise your abstract accordingly.) The abstract **DOES NOT contain** unique theory, discussion, nor data not found anywhere else in the report. The best way to learn how to write good abstracts is to read published articles in the field.

### Introduction

The Introduction explains the context of an experiment or study--that is, what is being studied, how it has been studied before, and any other information (conflicting theories, past results, past methods) that describes why this study is being performed as well as how this study or experiment differs from past studies in the literature of your field. In other words, the prior knowledge from your academic field of study will shape the hypotheses and theories that frame your study. As part of a course assignment, the purpose of your study/lab may be to replicate or verify results from other studies, to test methods and/or equipment, or to ascertain how new data-sets affect previously established research.

### Materials and Methods

This section provides description of the tools used and the procedures followed, written in a way that that a generally well-informed scientist in your field would be able to follow to repeat your study or experiment.

### Results

Display and summarize your data without interpreting it. For example, summarize a graph by stating that the data show an upward trend over time. What that trend means (interpretation) goes in the *next section*. It is important to accurately represent your data. That means you should use precisely-labeled tables and graphs with appropriate units and values. Also, show your calculations. (Note: in published literature, you usually don't see calculations in this section, but in school, you professors often want to see what you're doing and ask you to show your work.)

### Discussion

Use this section to interpret the data and develop ideas from your results. Talk about results in the context of theories presented in the literature and perform error analysis (when it's relevant). Expectations for this section vary among journals and professors. Sometimes this section will include the conclusion and sometimes professors will require certain analyses.

### Conclusion

The conclusion addresses questions such as: How did your results compare with your expectations for the experiment or study? What are the implications of this comparison? What new questions do you have? How might those questions shape the methods and purposes of future studies? (Note: These guidelines apply if/when the Conclusion is a separate item from the Discussion section; sometimes the conclusion is written within the discussion.)

### Citations

Any information derived from previous specific experiments or studies needs to be cited. The majority of your citations will often be in the Introduction. You can ask yourself, "Is this an accepted, well-established, and well-known idea in my field of study?" to determine if you should cite information or not. If you are unsure, citing a source is the prudent decision.

### Writing Style and Mechanics

You can use your class's lab manual, style guides from your discipline (e.g., an ACS, IEEE, or CSE guide), or your professor's guidance for specific style rules. Whether or not you should use active or passive voice and how you should refer to yourself as a researcher usually depends on your professor's requirements. Style is especially important when writing the abstract. Overall, it is important to practice being specific and concise.

### Read the Literature!

In other words, read published research results from your field. This, along with careful reading of the pre-lab and other course materials, is the best way to learn how to write good reports, especially at an advanced-level. You will pick up on the subtleties of the writing style and mechanics, and it is good practice for becoming a professional scientist.