Format of Lab Write-ups

# Formatting and Page Limitations[[1]](#footnote-1)

For the remainder of the laboratory reports in this course, we will use the headers: Abstract, Introduction, Methods, Results, Discussion, Conclusion(s), and References.

Submit the lab report in Microsoft Word. Adhere to the following requirements and restrictions:

1. Use 12 point Times Roman font, single spaced
2. Set margins to 1 inch for left, right, top and bottom.
3. Include a one-line header on the top of each page (above the 1” margin) that states:
4. The names of all group members.
5. Which laboratory is being described (e.g. “Pressure Recovery Distal to a Stenosis”).
6. Number each page on the lower right hand side (below the 1” margin).
7. Conform to the guidelines given in “Checklist for Figures,” and “Checklist for Graphs.”
8. Use the Microsoft Equation Editor for all equations in your document, including variables that are used within a sentence. (E.g. “Pressure () was measured with ….”)
9. Begin with a title page (laboratory title and group members).
10. After the title page, **state the role of each member** of your laboratory group, including which sections were written and revised by which group member.
11. Use the following page lengths as a guide. These lengths may vary from laboratory to laboratory.
12. Abstract: 1/3rd of a page (about 250 words).
13. Introduction: 1/2 page.
14. Methods: 1 page (including figures and tables).
15. Results: 4 pages (including figures and tables).
16. Discussion: 1/2 page.
17. Conclusions: 1/5rd page or less.
18. List of References: No limit.
19. Upload a single Excel file that contains all of the collected data, data reduction, and plots. **(You will lose 10 points from your report immediately if the Excel file is not included).**

# Content of Each Section

You are writing the report in the style of a journal article. You must not assume that the reader knows anything about the specific laboratory that you are doing or previous laboratories done in this course. Thus, you should not say, “as we did in Laboratory 2” or refer to “the laboratory instructions.” The basic sections, Abstract, Introduction, Methods, Results, Discussion, Conclusions, are standard.

## Abstract

The abstract is a brief summary of the experiment. Everything in the abstract will also be reported somewhere else in the paper. In general it will have one or two sentences for each one of the sections. 1) Introduction: What did you do and why was it done? 2) Methods: How did you attack the problem? 3) Results: What (quantitative) results did you find? 4) Discussion: How should the results be interpreted? 5) Conclusion: What is the main finding from the laboratory?

The main body of your report will then follow the headings below.

## Introduction

1. What clinical problem does this laboratory relate to?
2. What is the main question you are attempting to answer?
3. What is the general method used to answer the question?

## Methods

You will learn more about the structure of a Methods section in later courses. The one rule you should try to follow is to first describe the general setup, with an illustrative figure, and then provide specific details. The methods can be a shortened version of the laboratory instructions, but write them in terms of what you did, rather than (in the laboratory instructions) what you want someone else to do.

## Results

Grading of the Results section will be divided into three components:

1. The quality of your data.
2. The quality of your data analysis.[[2]](#footnote-2)
3. The quality of your presentation, including graph readability.

For each figure, introduce it in the narrative and describe it. After the description, place the figure. Each figure must have a figure number, and it must be introduced in the narrative by its figure number. The description of each figure should include a synopsis of the trend. E.g., what is its shape? (Is it monotonically increasing? Is it periodic? Is it nonlinear?) Do the measured results agree with theory? If they do not agree, in what way do they differ?

Consolidate multiple related curves onto a single plot, when appropriate. Consolidated curves help to keep your Results section within the required length and they allow the reader to more easily compare different curves.

## Discussion (15 points)

The discussion section will include interpretation of your experimental results. You should consider the following, but your report will probably have only a subset of these topics. Try to address at least three of these ideas, but do not force discussion of a topic if it does not seem relevant.

1. Clarify the distinction between the hypothesis tested and how it might be interpreted. (Try to think about how a reasonable reader might over-extrapolate the result).
2. What systematic errors are inherent to the experiment?
3. What is a quantitative estimate of the error inherent in the data?
4. Do the measurements agree with your theoretical analysis?
5. How could you modify your theoretical analysis to more accurately model your research question?
6. How can you modify the experiment to more accurately reflect the assumptions of the theoretical analysis?
7. Do the measurements agree with the fundamental physics of the problem? (See the list of validation questions in Appendix I).
8. Do the results agree with results from other researchers?
9. Where different types of measurements are taken, are they consistent with one another?
10. What do you notice about the data that you did not anticipate in the original experimental design?
11. What new problems do the results raise?
12. What is the practical (clinical) relevance of your results?
13. What further experiments need to be done?

Please do not parrot phrases from the above list. I.e., do not say “The system is valid because …” or “The measurements agree with the fundamental physics of the problem.” Rather, directly address the relevant issues.

## Conclusion

The conclusion should be 2 or 3 sentences. State the most important results from the laboratory. For laboratories in this course, the conclusion will generally iterate the extent to which the measured results agree with theory.

**Appendices and Data (5 Points)**

You must upload all data, in an Excel file. The file will include analyzed data, including plots of data mathematical manipulations. This may seem redundant to your report, but it is extremely useful for me to be able to go back to your Excel file to deduce how the data were manipulated to get the answers that you obtained.

1. The guidelines in this first section are somewhat arbitrary. They will be different for different journals. They are made specific here to give you some practice in following instructions and to answer some questions that you otherwise might have. You should assign on group member who will check the document at the end and ensure that the requirements are met. [↑](#footnote-ref-1)
2. Because simple mistakes are easily made in the data analysis, such as the use of diameter instead of radius, or incorrect unit conversions, you should have two group members do the data analysis separately and then, after it is completed, get together to make sure that both parties have the same results. You will often find that the two parties have different answers, and you will be able to find what calculations are wrong when you compare the results of the two parties. [↑](#footnote-ref-2)