

# GUIDELINES FOR LABORATORY REPORTS

*A version by Dr. Rapoff based on an original by Dr. Anderson*

**General Requirements:** The audience for this type of report consists of technically literate folks who can understand scientific topics if explained to them. The report must be on letter size paper with 1" margins all around and numbers on every page except the first. The main body of the text (i.e., the introduction through conclusions sections) should be as long as required, but no longer, and neat, legible and well organized. The experiment\* is already finished: use the past tense when referring to the experiment. The report still exists: use the present tense when referring to the report. Each paragraph should begin with a topical sentence: the reader should be able to read the first sentence of every paragraph and get a good sense of the report. Technical reports include "Figures" and "Tables" only: all plots, graphs, pictures, diagrams, drawings, etc. are "Figures", and tabulated items are in "Tables".

## SECTIONS OF THE REPORT<sup>†</sup>

**Title:** Include a descriptive and succinct title of the experiment, your name and the date. The course number and title may be included.

**Abstract:** An abstract is an "executive summary" that briefly describes the experiment and states the main findings. It summarizes the entire report in one paragraph of 250 words maximum. Write the abstract last but resist the temptation to copy chunks of text from other parts of the report. The abstract should emphasize the objective, procedure, results and significance, precisely and specifically. A technical report is not a mystery novel or a joke: state the main finding or conclusion (whodunit, the punch line) as soon as possible.

**Introduction:** Include a brief introduction that explains the purpose of the report and of the experiment. The introduction should also include any other background information or theory that readers need to know. Explain what was done and why it was done.

**Materials and Methods:** Use paragraph form to describe the steps taken to perform the experiment, describing measurement techniques and the apparatuses used, including diagrams and equations as appropriate. Provide enough information so that another researcher in this field could use the description to replicate the experiment.

**Results:** Present results dispassionately. Although results are usually presented quantitatively, you should always introduce each block of information with simple clear language. Include measured results, an estimate of the experimental uncertainty and any calculations used. In many cases, it is sufficient to provide a sample calculation with clear explanation of the equations. Use figures and tables as necessary and all must have descriptive captions, not captions, e.g., that just repeat the axis labels of a plot.

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\* The term "experiment" is used throughout, but the report may or may not include experimental results and may or may not include mathematical or computational analyses.

<sup>†</sup> These section titles may not be appropriate for other types of reports, e.g., design reports.

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**Discussion and Conclusions:** Explain, analyze and interpret the results of the experiment. Discuss experimental and theoretical results and why they do or do not agree. Explain the results in the context of related existing data. Explain any errors associated with the measurements. Focus the discussion on the following questions:

- What results were expected? What results were obtained? Why are there any discrepancies?
- Are any results of particular technical or theoretical interest?
- How do the results relate to the experimental objectives?
- How do the results compare to those obtained in similar investigations?
- What are the strengths and limitations of the experimental design?
- What were the sources of any difficulties encountered in the experiment? How might they be avoided in future experiments?

Draw conclusions from the results and discussion that answer the question "so what?", then go on to explain the conclusions.

**Acknowledgements:** Fully acknowledge assistance received from others with simple statements, e.g., "Thanks to Dr. Rapoff for use of his force sensor and data acquisition equipment."

**References:** Provide bibliographical information for any material that is not original and is cited in the report, e.g., technical specifications, equations and data.

**Appendices:** Appendices are designated with consecutive letters in the alphabet beginning with "A" and must be titled. Appendices should include raw data, calculations, graph, and other quantitative materials that were part of the experiment but not detailed in any of the above sections. Refer to each appendix at appropriate points in the report, e.g., at the end of the results section might be an appropriate location to refer to raw data in an appendix. Note the appendices must be self explanatory: simply listed page after page of numbers with no explanation is unacceptable. Such data must be tabulated, captioned and described.