Guidelines on how to write a technical report

As a scientist or engineer, you will perform, during your future working life, experiments to test hypotheses about different phenomena and measurements so as to gain knowledge about a new product. After experiments or measurements are completed, the conclusions drawn should be available for others to be used further. The lab report or the scientific paper is the vehicle often used for dissemination, and should, therefore, be written in a clear and understandable way. Hereafter, general guidelines about how to write a technical report are given (this is, of course, an orientation and the structure could be modified if needed).

Format

A scientific report usually consists of the following sections

1. Title
2. Abstract
3. Introduction
4. Materials and methods
5. Results
6. Discussion
7. Conclusions
8. References

1. Title

The title should not be too long and should reflect the factual content of the report. Keep in mind that a scientific title is not written to catch the reader's fancy. A good title is straightforward and uses keywords that researchers in a particular field will recognise.

2. Abstract

The abstract is a general and concise summary of the report, and should include the purpose, the methods employed and the major conclusions obtained. One should write the abstract keeping in mind that its purpose is to allow a potential reader to judge whether it would be useful for his or her purposes to read the entire report.

3. Introduction

The introduction defines the subject of the report. It must outline the scientific purpose(s) or objective(s) for the research performed and give the reader sufficient background to understand the rest of the report. One should try, when writing the introduction, that it responds to questions of the type: *"why was this study performed?", "has any study of this type been performed prior to this one?"* (i.e. a literature study should be included at this stage), *"which hypotheses have been considered here?",* etc.

4. Materials and Methods

In this section, enough details for the reader to understand the experiment should be given. Describe the equipment used during the measurements or experiments as well as the object(s) under study, the materials, and the lab/environment where measurements were performed. Also, the measurement set-up together with the reasoning of why it was done that way (even one could discuss why other possible methods were discarded) as well as the general theoretical background of the methods that were utilised should be presented. Include along drawings or pictures of the experimental apparatus, set-ups, etc. if they would provide useful additional information.

5. Results

The results section should summarise the data from the experiments without discussing their implications. The data can be organised into tables, figures, graphs, photographs, and the like. All figures and tables should have descriptive titles and should include a legend explaining any symbols, abbreviations, or special methods used. Figures and tables should be numbered separately and should be referred to in the text by their number.

When including figures and tables, think in a way that they should be self-explanatory; that is, the reader should be able to understand them without referring to the text (i.e. by just looking at the figure or table together with the caption and legend). All columns and rows in tables and axes in figures should be labelled. Also, if several plots are dealing with the same type of measurements and the results contained in them are to be compared with each other, it is advisable to keep the same scale in the axes so it is easier to compare them at first glance.

6. Discussion

This section interprets the data contained in the previous section, relating them to existing theory and knowledge. In writing this section, you should explain the logic that allows you to accept or reject your original hypotheses. You should also be able to suggest future experiments that might clarify areas of doubt in your results as well as point out possible improvement of techniques or experimental design. Also, it should be discussed the possible sources of errors that could have occurred during the measurements. Keep in mind that this section should not just be a restatement of the results.

7. Conclusions

If the discussion section is too long, one can restate, in a much summarised way, the conclusions discussed in the previous section as well as suggest further work along the lines of the one presented. Sometimes, this section can stick together with the previous one, i.e. “Discussion and Conclusions”.

8. References

This section lists all materials (e.g. articles, books, websites, lecture notes, etc.) cited in your report or used during its elaboration. There are several systems for writing references (Harvard, Oxford, Vancouver, APA, IEEE, MLA…). Choose one and stick to it, i.e. do not mix styles.

After writing a report, read it over, watching especially for lack of precision and for ambiguity. Each sentence should present a clear message. The only way to prevent such errors is to read and think about what you write. Learn to reread and edit your work. To pre-evaluate your own report, think that another student, by reading it, shall be able to take it as an instruction, go down to the laboratory, repeat the measurements and get the same results.