

# GUIDELINES FOR WRITING LABORATORY REPORTS

## 1. COVER PAGE

To aid the administration of the course, we ask that you include the following information, centered, on the cover page of your report.

Title of the Experiment

Author

Co-workers

Section\_\_\_\_\_, Group\_\_\_\_\_

Date Due\_\_\_\_\_

Date Received\_\_\_\_\_ (leave blank)

## 2. ABSTRACT

The abstract is a summary of the experiment that briefly describes the topic of the investigation, the experimental method, and numerical results. Although the abstract goes at the front of the report, we recommend that you write the abstract last. The abstract should be brief, no more than 200 words.

## 3. INTRODUCTION

A good introduction provides the background needed to understand the purpose and scope of the work described in the remainder of the report. For MSE 307 reports, this means that the introduction should inform the reader how this experiment fits into the context of the field of materials science and engineering. You should also introduce how you did the experiment: i.e., briefly describe the approach and the instrumentation that you used to collect the data.

The introduction does not contain details of laboratory procedure or data analysis; that information is contained in the “Experimental Details” and “Results and Discussion” sections. Try to keep the length of the introduction to less than one page of double-spaced text.

#### **4. EXPERIMENTAL METHODS**

The “Experimental Methods” section is a self-contained, chronological account of the procedures followed during the experiment, stated in your own words. The methods section should contain sufficient detail to enable a skilled operator of the equipment to duplicate the experiment. Brief descriptions and drawings of equipment, and circuit diagrams are also helpful in explaining the experiment. Two pages of double spaced text are usually sufficient for this section.

#### **5. RESULTS AND DISCUSSION**

“Results and Discussion” will comprise the majority of your report. In this section, you will present your observations, data, and analysis of the data in a logical order, usually organized by the order in which you acquired the data. We recommend that you avoid the use of tables in this section; an x-y plot of the data is much more useful in showing the connections between variables. If possible, you should compare your results to theoretical expectations and accepted values. The discussion will also include an analysis of random and systematic errors. A typical length for this section will be 4 pages of double-spaced text but, depending on the complexity of the experiment, more text is sometimes needed.

#### **6. CONCLUSIONS**

A conclusions or summary section is often redundant (the abstract should state any conclusions and summarize the numerical results) and should only be included if you have something additional to say that you have not already stated in the abstract or the discussion.

#### **7. REFERENCES**

For most classes, a laboratory report will include a list of references that acknowledge the sources of non-original information, data, and ideas (in other words, ideas and data not originating with the author). For MSE 307 lab reports, however, to save time, you are not required to include a list of references. We will assume that your sources are the lectures, the assigned reading, and the textbooks that you have used in your MatSE courses.

#### **8. SUBSECTIONS**

Subsections can be helpful in organizing a long report. Each subsection has a unique number and title as shown in the following examples.

##### **8.1 FEEDBACK**

We welcome comments from students on the organization, selection, and administration of the MatSE 307 experiments, but please do not include this feedback in your laboratory reports.

Email messages or notes on paper (anonymous or signed) on how to improve the labs, reading assignments, and handouts will be greatly appreciated

## 8.2 LENGTH

An excellent laboratory report does not have to be long. The text of the full laboratory report (Abstract, Introduction, Experimental Methods, Results and Discussion, and optional Conclusions) will only rarely exceed 8 pages of double-spaced text (plus cover sheet, figures, and tables.) The grade will be based on your execution of the experiment, the quality of your analysis and presentation of the data, your analysis of errors, and the clarity and thoroughness of your writing.

## 9. FORMATTING DETAILS

The report must double-spaced and stapled in the upper left corner. Equations and figures can be done totally or partially by hand but please make sure that these elements are neatly drawn.

Plots of data, photographs, and drawings are referred to collectively as “Figures” and are numbered in order. You should use the full word, e.g., Figure 1, at the beginning of a sentence but use the abbreviation, Fig. 1, in the middle of a sentence. Captions for figures are placed at the bottom of the illustration. You should place each figure on a separate page that contains no other text than the caption. This procedure will help you avoid the tendency to create figures that are too small to be read clearly. The minimum font size in the text and figures is 12 pt. Table captions go at the top of the table. Tables are numbered separately by roman numerals, e.g., Table I followed by Table II.

A label on the ordinate (y-axis) and abscissa (x-axis) of each plot of data defines what variables are being plotted. The independent variable should be plotted on the abscissa. Error bars should be included when appropriate to show the size of possible errors in the measurements. Plots should usually (but not always) start at the origin (0,0) to avoid creating a visual bias to the data. A logarithmic axis often works well in presenting data that span a large range of values.

Equations are numbered consecutively. Please make sure that the meaning of each variable is defined in the text.

Decimal numbers less than one are easier to read when they have a leading zero, for example 0.01, not .01.

## 10. WRITING CLARITY AND STYLE

A few tips and reminders are listed below.

- I cannot emphasize enough the importance of writing clearly and concisely. If you are looking for a textbook to help you improve your skills, I highly recommend *Style: Ten Lessons in Clarity and Grace*, by Joseph M. Williams.
- Most word processors have sophisticated grammar checkers. We recommend the use of these grammar checkers for improving the clarity of your writing.

- Keep the tense consistent and avoid overly complicated tenses; usually simple present tense is best. The main exception is the description of the experimental method where past tense is often more natural.
- Avoid contractions.
- Avoid gender-specific terms and pronouns.
- Reports should be self-contained and written at a level that another junior in MatSE will fully understand your report but also learn something from reading your report.
- Omit the word "very" and other similarly vague words. Strive to make your discussion quantitative.
- Avoid pronouns and avoid starting a sentence with "It" or "There".
- Most sentences will be clearer in an active voice; i.e., do not use the passive voice too often.
- Provide a comprehensive figure caption for your illustrations. Nothing in the figure can be left unexplained, either by the caption or the text.
- Use short, single idea paragraphs.