Guidelines for End-of-Term Research Reports

REFERENCE: The following content has been modified from the American Chemical Society Committee on Professional Training's "Preparing a Research Report" document:

https://www.acs.org/content/dam/acsorg/about/governance/committees/training/acsapproved/degreeprogram/preparing-a-research-report.pdf (accessed June 16, 2016).

Organization of the Research Report

Most scientific research reports, irrespective of the field, parallel the method of scientific reasoning. That is: the problem is defined, a hypothesis is created, experiments are devised to test the hypothesis, experiments are conducted, and conclusions are drawn. The exact format of scientific reports is often discipline-dependent with variations in order, content, and style. The student is encouraged to adopt the format that is most appropriate to the discipline of the research. Many journals offer a formatting template to aid the author. One example of such a framework is as follows:

- Title
- Abstract
- Introduction
- Experimental Details or Theoretical Analysis
- Results and Discussion
- Conclusions and Summary
- References

Suggested Length:

2-3 pages text minimum plus figures. The mentor should help determine the appropriate length for the report. Font may be Size 12 Times New Roman or Size 11 Calibri, and 1-inch margins are suggested.

Title and Title Page

The title should reflect the content and emphasis of the project described in the report. It should be as short as possible and include essential key words. The following is one possible format for the title and author information. All of the below information could appear on a single cover page. *See corresponding example template for mentor/mentee signature blanks.* The title page and document should be submitted as one document, the first page of which is the title page.

Title

*Authors: First name, Middle initial, Last name (include all contributors to the work, separating authors with commas (list your advisor(s) last and specify as demonstrated on the corresponding template, and use superscript numbers to indicate institution(s) and department(s) as demonstrated on the corresponding) template)

[1]Department of _____, University of _____, City, State Abbrev #####

[2]Department of _____, _____ City, State Abbrev #####

In partial fulfillment of BUILD Research Experience

Term Year

Abstract

The abstract should concisely describe the topic, the scope, the principal findings, and the conclusions. It should be written last to accurately reflect the content of the report. The length of abstracts varies but seldom exceeds 200 words.

A primary objective of an abstract is to communicate to the reader the essence of the paper. It should provide sufficient information to describe the important features of the project in the absence of the rest of the document. The reader will then be the judge of whether to read the full report or not. Were the report to appear in the primary literature, the abstract would serve as a key source of indexing terms and key words to be used in information retrieval.

Introduction

"A good introduction is a clear statement of the problem or project and the reasons for studying it." (The ACS Style Guide. American Chemical Society, Washington, DC, 2006.)

The nature of the problem and why it is of interest should be conveyed in the opening paragraphs. This section should describe clearly but briefly the background information on the problem, what has been done before (with proper literature citations), and the objectives of the current project. A clear relationship between the current project and the scope and limitations of earlier work should be made so that the reasons for the project and the approach used will be understood.

Experimental Details, Computation Procedures, or Theoretical Analysis

This section should describe what was actually done and should be written in passive past tense. It is a succinct exposition of the laboratory and computational details, describing procedures, techniques, instrumentation, special precautions, characterization of compounds and so on. It should be sufficiently detailed that other experienced researchers would be able to repeat the work and obtain comparable results.

In theoretical reports, this section would include sufficient theoretical or mathematical analysis to enable derivations and numerical results to be checked. Computer programs from the public domain should be cited. New computer programs should be described in outline form.

If the experimental section is lengthy and detailed, as in synthetic work, it can be placed at the end of the report so that it does not interrupt the conceptual flow of the report. Its placement will depend on the nature of the project and the discretion of the writer.

Results and Discussion In this section, results including relevant data, observations, and findings are summarized. Tabulation of data, equations, charts, and figures can be used effectively to present results clearly and concisely. Schemes to show reaction sequences may be used here or elsewhere in the report. The crux of the report is the discussion of the analysis and interpretation of the results. What do the results mean? How do they relate to the objectives of the project? To what extent have they resolved the problem? Because the "Results" and "Discussion" sections are interrelated, they are often combined into one section, but they are sometimes presented separately.

Conclusions and Summary

A separate section outlining the main conclusions of the project is appropriate if conclusions have not already been stated in the "Discussion" section. Directions for future work are also suitably expressed here.

A lengthy report, or one in which the findings are complex, usually benefits from a paragraph summarizing the main features of the report - the objectives, the findings, and the conclusions.

The last paragraph of text in manuscripts prepared for publication is customarily dedicated to acknowledgments. However, there is no rule about this, and research reports or senior theses frequently place acknowledgments following the title page.

References

Thorough, up-to-date literature references acknowledge foundational work, direct the reader to published procedures, results, and interpretations, and play a critical role in establishing the overall scholarship of the report. The report should include in-text citations with the citations collated at the end of the report and formatted as described in a standard established by an appropriate journal. The citation process can be facilitated by using one of several available citation software programs. In a well-documented report, the majority of the references should come from the primary literature. Because Internet sources are not archival records, they are generally inappropriate as references for scholarly work. They should be kept to a bare minimum.

Preparing the Manuscript

The personal computer and word processing have made manuscript preparation and revision a great deal easier than it used to be. It is assumed that students will have access to word processing and to additional software that allows spelling to be checked, numerical data to be graphed, chemical structures to be drawn, and mathematical equations to be represented. These are essential tools of the technical writer. Use formal language for scholarly writing. All manuscripts should be carefully proofread before being submitted. Preliminary drafts should be edited by the faculty advisor (and/or a supervising committee) before the report is presented in final form. See corresponding template title page for mentee and mentor signature slots.

Figure and Table Formatting:

Refer to the corresponding example journal article for examples of proper table and figure formatting. Typically, table captions appear above the table and are numbered in chronological order. Figure captions typically appear below the figure and are also numbered in chronological order. In text, tables and figures should be referred to by their number (Ex. Figure 1 illustrates _____.)