WRITING IN CHEMICAL AND BIOLOGICAL SCIENCES

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Applicable Courses

- Biology
- Chemistry
- Nursing

*This workshop is primarily for writing laboratory reports, as Arielle, Alanah, and Mike seemed to have already covered sourcing.
Learning Outcomes

• Aid students in writing laboratory reports, specifically dealing with science classes.
• Differentiate between case studies (psychology/sociology/boring sciences) and laboratory reports (chemical/biological science).
Content

• No preliminary science skills necessary.
• Basic control of word processing systems.
• Patience
Real Quick…

• What is the difference between a hard and soft science?
Differences between disciplines

• Hard sciences are categorized as sciences that are numerical, more accurate, and rigorous. Hard sciences usually make use of quantifiable empirical data and the scientific method. Variables are usually few and easily identified.

• Soft sciences are (quite frankly) none of the above.

• Note: so, chemistry is an example of a…

• Sociology is an example of

• Political science is (harder) than most, but not hard enough to write a laboratory report for, so don’t worry about it.

Why is this important?

• This workshop is geared for hard science lab reports. These reports are used to present numbers and
quantifiable data in a meaningful, professional way, and they are not interested in making philosophical or ideological predictions.

Soooooooon... 

- Laboratory Reports
- Consist of
- Title Page
- Introduction
- Abstract
- Materials and Methods (often divided)
- Data
- Results
- Discussion
- References

Title Page

- Sometimes optional
- Consists of the name of the lab, name of the student, name of the professor, date of the experiment was conducted (not the date the report is to be turned in).
The Introduction

• Not an abstract.
• Discuss the purpose of the experiment without delving into methods and materials.
• More often than not, scientists will use this section to promote how the experiment will lead to a larger benefit or cause.
• Not always unbiased.

More on the introduction…

• Readers can appreciate objectives.
• Current knowledge is often informed.
• Balance (not too broad, not too detailed).
• How does work fit in with previous works of different researchers?

The Abstract

• Summarizes major elements of the paper.
• Informative, but brief
• The abstract can stand on its own.
• 250 words or less
• Often used in conjunction with or in place of the introduction.
• Sometimes easiest to write last (why is this?)

**Materials/Methods**

• Include enough information so that your study can be repeated.
• Unnecessary tools need not be listed, while optional materials should be listed.
• EX. The microwave used to heat your lunch while an experiment is taking place should not be included in your report.
• Methodology provides the context and basis for evaluating gathered data.
M & M’s (haha…)

• Can often be used to evaluate the worth of an experiment, as well as a means to check the credibility of the researcher.
• magnifying glass < electron tunneling microscope
For biology…

- Taxonomic information is important. This includes, but is not limited to: age, sex, size, physiological state, rearing conditions, predisposition.

- This may also apply to nursing classes. Chemistry will almost never make use of live subjects.
Methods

• Procedures should be discussed in detail. Information regarding the status of your experiment, including pH levels, moods of live subjects, time periods, and temperature conditions are important and should be included.
• Omit unnecessary information.
• Refer back to the microwave.

Data

• Includes tables, charts, experiment status, time marks, and numerical data that has not been interpreted or analyzed.
Tables and Charts…

• …are like pictures. They may say a thousand words, but if the object in question is incorrectly placed, the presenter will end up saying a thousand WRONG words.
Results

• Summarize and illustrate your findings.
• Do not interpret the data or draw major conclusions.
Discussion

• Tell your reader what your findings mean.
• Speak in past tense.
• Cite tables/research figures.
• How do results fit in the bigger picture?
• Negative results may not always be a bad thing, so report them.
More about discussing...

- Don’t offer every conceivable notion, thought, or explanation, and do not predict the inconceivable.

Voice

- Your discussion must convey...
authority and confidence without sounding arrogant.

- Again, find a balance.

References

- Professional papers follow CSE (Council of Science Editors) formatting. For College of the Canyons, use MLA or APA formatting.
• CSE utilizes name year system.
• Ex … addicts tend to sell their molars (Norihiro 2011).
• Ex. As documented by Norihiro et al. (2011), Red Bull does not give you wings.
• If two researchers have the same last name, include a first initial, just like APA.
• Do not cite common knowledge or background research.
• References page will either follow CSE formatting or APA formatting.
• Refer to Writing Papers in the Biological Sciences (McMillan 2012).
Consult your resources.

• Rules for Writers
• Writing in Biological Sciences
• Other tutors.
• This is a time consuming process. Papers in science are often time sensitive and ever changing.
• Have patience; don’t get frustrated.