The elements of a scientific lab report may be included in some form when writing a thesis, dissertation, journal article, report, or poster. Although not every scientific publication requires all of these elements, and may combine, rearrange, or add categories, the main sections are generally as follows. For the correct format, study scholarly publications for examples of papers similar in subject and content to the one being composed. For undergraduate students writing a scientific lab report, pay particular attention to the title, abstract, introduction, methods, results, discussion, and conclusion. Graduate students should make sure that the have the needed sections listed below.

I) TITLE
Create a title that is specific enough to describe the topic of the paper, but not so technical that only experts can understand. Pay attention to the capitalization, as it differs between citation styles. Keep in mind that titles will appear in keyword searches, so include terms strategically. For example, APA (American Psychological Association) style dictates that a title would be capitalized as, “Interacting coastal based ecosystem services: Recreation and water quality in Puget Sound, WA.” (first word and proper nouns capitalized, as well as first word after colon).

II) ABSTRACT
The abstract is an important part of the paper—readers will look here to determine if they want to access and read the full article. An abstract is a self-contained, concise, and straightforward statement that describes a larger work. It is an original (i.e., not excerpted from the rest of the paper) text that summarizes the main components of the information that follows, such as the study scope, purpose, results, and conclusions. For more information and examples, see NC State handout on abstracts.

III) INTRODUCTION
The introduction functions as a mental road map, and may have sections that show:
   1. What was studied?
   2. Why was this topic important to investigate?
   3. What was known about this topic before this study? (similar to a literature review)
   4. How will this study advance new knowledge or ways of understanding?

IV) MATERIALS AND METHODS
This section describes the rationale for the use of specific procedures or techniques, allowing readers to critically evaluate a study’s overall validity. It answers two main questions:
   1. How were data collected or generated?
   2. What methods of data analysis were used?
The writing in this section should be direct, precise, and **always written in the past tense**. For example, “Survey methods were based on a collection of GPS points.”

V) RESULTS
This is where the findings of the study are reported, based upon the methodology applied to gather information. This section should state the findings of the research in a logical sequence, without bias or interpretation. This section **should be written in the past tense**. This section may not be necessary if no new data were collected. Results may include the following elements, in addition to the text:

- Tables and graphs
- Summary statistics
- Photos or graphics
- Interview summaries
VI) DISCUSSION
The purpose of the discussion section is to interpret and describe the significance of the findings in light of what was already known about the research problem being investigated, and to explain any new understanding or insights about the problem. The discussion will always connect to the introduction through the research questions posed and the literature reviewed. The discussion should explain how the study has changed the understanding of the problem. Questions to address in this section may include:

● Do the results provide answers to the testable hypotheses? If so, how are the findings interpreted?
● Do the findings agree with what others have shown? If not, do they suggest an alternative explanation or unforeseen design flaw in the experiment?
● Given these conclusions, what is the new understanding of the problem investigated and outlined in the introduction?
● If appropriate, what would be steps for future studies on this topic?

VII) CONCLUSIONS
The conclusion uses clear, simple language to restate the main argument as outlined in the introduction. Elements to consider including here are:

● A synthesis of arguments presented in the paper to show how these converge to address the research problem or study objectives
● How the findings differ from or support those of others and why
● Opportunities for future research (if not included in discussion section)

VIII) ACKNOWLEDGMENTS
This is a section in which the author(s) can thank those who have supported or contributed to the study, such as advisors, committee members, family, colleagues, or sponsors. Depending on the format of the paper, this may instead be included at the opening of the paper, or not at all.

IX) REFERENCES (sometimes referred to as Works Cited, or Bibliography)
Depending on the field, most scientific papers should be written using one of the following citation styles:

● APA (American Psychological Association): most commonly used for subjects within the social sciences (Anthropology, Political Science, Economics, Sociology, etc.)
● CSE (Council of Science Editors): most commonly used for subjects within the sciences (Physiology, Bioengineering, Organic Chemistry, Neuroscience, etc.).
● For examples of proper reference formatting, visit the Purdue Online Writing Lab.

It is important to know the reference style that will be used prior to writing the paper, to avoid having to go back and look up information for the entries.

X) APPENDICES (singular: appendix)
This section is for additional items, such as:

● Glossary/definitions
● Index
● Graphs, tables, or illustrations
● Forms (such as a survey used in the study)