General Guidance for Writing a Thesis or Dissertation

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General Guidelines

1. All manuscripts for review should be double spaced except labelling for tables, figures, and figure captions. Tables and figures need not be double spaced.

2. Contents must be organized logically. Prepare a detailed outline prior to writing your manuscript. All manuscripts should have headings and subheadings. Large manuscripts normally have at least three levels of headings.

3. Content is dictated by the nature of the manuscript. In general, it is recommend that as much of the long mathematical derivations and supporting data as possible be placed in appendixes. Keep the primary part of the text brief and informative.

4. Be as original and imaginative as the topic allows. Use a multiple-hypothesis approach and treat the competing hypotheses without prior bias.

5. Factual material based on measurements and observations must be distinguished clearly from inferences and conclusions. Also, your own work should be identified clearly as contrasted with the work of others. Do not introduce new factual material into sections intended as summaries or conclusions.

6. Strike a good balance between naively accepting data and conclusions given in published reports and a hypercritical attitude towards everything.

7. Be consistent throughout your report in punctuation, abbreviation, capitalization, and other matters of typographical style even though the initial choice of style may be arbitrary.

8. Use a standard citation style from any major scientific publication, but make sure the following facts are included: Author’s name with initials, date of publication, full title of article or book, name of journal or publisher, volume, and pages which include the material being cited. Whatever style is used, it must be consistent throughout the paper.

Figures and Tables

1. Make sure that, insofar as possible, illustrations can be understood without reading the text. To do this, special care should be taken with labels and figure captions.

2. All figures and tables presented should be numbered and should include titles and/or captions.

3. Copies of figures from published literature can be used but they must be renumbered and the source must be given.

4. All illustrations and tables should be cited in the text.
5. Citations should be in numerical order; that is, Table 2 should not be discussed prior to Table 1 in the text.

6. Orient figures properly - do not turn them side-ways on a page. The legend on the many graphs may end up being upside down on the page if the figures are oriented side-ways. It is better to reduce the figure so that it can be placed upright on the page.

7. Exact camera location and direction in which the camera was pointed should be given in captions to all photographs.

8. All maps should include a scale, geographic coordinates, and a north arrow.

**Equations and Units**

1. Number all equations and define all symbols used in an equation. Use symbols instead of names in the equation, i.e., $y = mx + b$ instead of $Growth = a \times Water\ Content + b$. Also, do not place the multiplication sign ($\times$) in equations.

2. Always use metric (S.I.) units. Report all measurements in consistent units, preferably mks (meters, kilograms, seconds) instead of cgs (centimeters, grams, seconds).

3. If a unit conversion is required for some reason, place the english equivalent in parentheses following the metric value, example: “The core measured 5.1 cm (2 inches)”

4. Use liters (L) for all volume measurements instead of $m^3$ or $km^3$.

5. Use standard metric prefixes ($\mu$ for millionth, $m$ for thousandth, $c$ for hundredth, $k$ for thousand, $M$ for million, etc.) for small and large numbers.

**Common Writing Errors**

1. Reversal of sentence structure. One of the most common errors is to reverse the proper order of a sentence.

   **Incorrect:** To understand the nature of the problem, I performed an experiment.

   **Correct:** I performed an experiment to understand the nature of the problem.

2. Spell out numbers less than or equal to twelve. Do not used phrases such as “The 1st day was rainy, ...”, or “The student measured rain for 3 days”. It is allowed to use numbers if decimal points are provided, “The core measured 5.0 cm in diameter”.

3. Abbreviations vs. Acronyms. An acronym is a voiced abbreviation, such as “NASA”. “NSF” is spelled out so it is an abbreviation. Proper use in a sentence depends upon whether the word is an acronym or an abbreviation. For example, we would say “a NASA project was funded” because NASA is voiced, while “an NSF project was funded” is correct because NSF is not voiced.

4. No periods are ever used for federal abbreviations (e.g., TVA, NASA, USGS, etc.). The only allowed use of abbreviations is for abbreviating the United States (e.g., U.S. Department of Interior, but not U.S.D.I.)

5. Avoid the future tense. “This paper will address the issue of...” should be written “This paper addresses the issue of...”.

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6. Citations in the present tense. All published work is already completed and should be referred to in the past tense.

Incorrect: “Smith (1980) reports his results…”
Correct: “Smith (1980) reported his results…”

7. Poor punctuation. Commas are used primarily to substitute for conjunctions such as “and” in a series of words. To avoid confusion, a comma can also be used before the conjunction as in the following example:
“Supplies and equipment included chemicals, bottles and caps, and augers.”

8. Commas are also necessary to set off words or phrases which do not follow the normal English word order (subject-verb-object). Example:
“If the test is negative, further data are needed.”

9. Poor spelling. In addition to obvious errors, preferred spelling should be used.
   • “Through” not “thru”
   • “gray” not “grey”
   • “acknowledgment” not “acknowledgement”
   • “vapor” not “vapour”

Choice of Words

1. Make good use of words and phrases such as however, but, because, in spite of, in order to, and in contrast with. While their use often helps the reader follow your thought process, their overuse can be distracting.

2. Avoid incorrect words. A number of incorrect and/or slang words have been adopted by Americans. Avoid these if possible.
   • “antedate” not “predate”
   • “proved” not “proven”
   • “heterogeneous” not “nonhomogeneous”
   • “correct” not “OK”
   • “affected” not “impacted”

3. Confusion of singular and plural words.

<table>
<thead>
<tr>
<th>Singular</th>
<th>Plural</th>
</tr>
</thead>
<tbody>
<tr>
<td>datum</td>
<td>data</td>
</tr>
<tr>
<td>stratum</td>
<td>strata</td>
</tr>
<tr>
<td>analysis</td>
<td>analyses</td>
</tr>
</tbody>
</table>

(Note: Never write or say “the data is …”, use instead “the data are …”)

4. Unnecessary words. Examples follow and are underlined.
   • The color of the water was red.
   • The area is located in the Coronado National Forest.
   • Tests were difficult because of the close proximity of the motor.
• The storm lasted three months of time.
• The storm started at 3 a.m. in the morning.

5. Confusion of time and abundance terms.

<table>
<thead>
<tr>
<th>Time</th>
<th>Abundance</th>
</tr>
</thead>
<tbody>
<tr>
<td>never</td>
<td>absent</td>
</tr>
<tr>
<td>infrequent or sometimes</td>
<td>rare or scarce</td>
</tr>
<tr>
<td>frequent or often</td>
<td>common</td>
</tr>
<tr>
<td>constant or continuous</td>
<td>ubiquitous or everywhere</td>
</tr>
</tbody>
</table>

(Note: “continuous” can be used for linear “abundance,” such as “The outcrop was continuous . . .”)

6. Poor choice of words. Note the following examples.

• “since the pumping test . . .” could mean “Since” in a time sequence, such as “Since (after) the pumping test was made, we continued with the project.” “Since” could also indicate a cause and effect relationship, but the words “because” or “inasmuch as” convey this meaning better. “Inasmuch as the pumping test was a failure, further work was necessary . . .” leaves no doubt in the reader’s mind that a cause and effect relationship is being discussed.

• “The data were evaluated via the Theis equation.” The word “via” should be replaced by “with”. The word “via” should be used only in a geographic sense, as “The trip was routed via Tucson.”

7. The meaning of the following pairs of words should be checked before using:

• affect vs. effect
• apt vs. likely
• alternate vs. alternative
• decide vs. determine
• fewer vs. less
• farther vs. further

8. Use “over” to indicate position in space and not to mean “more than”. Words such as “very”, “many”, “most”, “extremely”, “little”, “few”, “occur”, and “instance” convey little meaning and should be used sparingly. “For example” should be used in place of “for instance.”

9. Proper use of assure, ensure, insure.

• Insure means to underwrite an insurance policy: “We payed Lloyd’s of London to insure the water.”
• Assure means to set a mind at rest: “The test assured me that the water was clean.”
• Ensure means to make certain: “We treated the water to ensure that it was clean.”

10. Modern writers and speakers misuse the adverb “hopefully”. The phrase “Hopefully, we can walk to the store,” means “We can walk hopefully to the store.” Which does not make sense. The author really means “I hope we can walk to the store.”

11. Weak opening statements. Avoid “One may say that,” “it is,” “there were,” “it may be shown that,” and similar constructions in sentences and phrases. Example:

Incorrect: “It was generally thought that the well was dry.”
Correct: “The well was thought to be dry.”
12. Compounding of adjectives. Do not use a Germanic style, “...the wide turbid high gradient desert ephemeral stream.”

13. False elegance. Scientific writing should always use direct and simple expressions. Nothing is gained by using unusual, showy, or wordy prose. Examples follow:

<table>
<thead>
<tr>
<th>Wordy or showy</th>
<th>Better style</th>
</tr>
</thead>
<tbody>
<tr>
<td>A majority of as far as our own observations are concerned, they show initiate fewer in number in the near future lenticular in character there can be little doubt that he is in a position to inaugurate portable, manually operated pump prioritize</td>
<td>most observation shows start fewer soon lenticular undoubtedly he can begin hand pump rank</td>
</tr>
</tbody>
</table>

14. Pathetic fallacy. Do not ascribe human traits or emotions to inanimate objects.

“The happy gushing of the spring water.”


- Too many words: “Among the options considered, the one with the least amount of cost associated with it was eventually selected”. The author could have said, “The cheapest option was chosen.”
- Too many abbreviations “The APR stated that NRC contacted PI’s of the NSF grant to check MPC’s listed in CFR 190-40 prior to issuance of the RFP.”
- Needless capitalization: “The Committee met with Federal and Western State representatives to University Contractors.”
- Senseless buzz phrases: “To be cost effective in the bottom line, power requirements were adapted by prioritization to allow a retrofit of existing equipment”. Say instead, “The old equipment was refurbished in order to save money.”