Writing Scientific Reports

Formal Reports Should Include the Following

1. Title Page
   a. Title indicates the scope of the paper (not ____ Assignment).
   b. Names of authors and co-authors
   c. Date of submission and to whom it was submitted
   d. Contact information (email address of corresponding author)
   e. If you studied a specific location and the results apply only to this location, then where the study was conducted should be included in the title.

2. Abstract
   a. Title abstract provides a brief overview of the who, what, when, where, how and why in a single paragraph (two maximum).
   b. Include the main findings/results (NOT ____ will be discussed)
   c. Do not list results but describe their broader significance in terms of what is novel in your study Introduction

3. Table of Contents
   a. List each heading and page where it is found
   b. List subheadings and corresponding page numbers

4. List of Tables
   a. This is usually given on a separate page from Table of Contents. However, it may be included on the same page if there is room and only a few tables
   b. List the Tables and Table captions and corresponding page number

5. List of Figures
   a. This is usually on a separate page from Table of Contents
   b. List figures and captions and corresponding page number

6. Introduction
   a. General question
   b. Background literature
   c. Purpose of this study
   d. Do not cite lab manual

7. Methods
   a. Location (description should be general enough for someone from another continent to be able to locate where your study was conducted. UTM or lat/long
   b. Dates, including year
   c. Plot/sample sizes
   d. Criteria for data collection
   e. What was measured and how
   f. Do not include methods for results that are not discussed
   g. Statistical methods outlined and measure of uncertainty specified
   h. Do not refer to the lab manual; use your own words

8. Results
   a. Written in past tense
b. Point out interesting observations but do not include your interpretation in results
c. Describe trends in normal, straightforward language (not statistics-ese)
d. Include data to support statements in ONE of Tables, Text, Figures
e. Data in text are preferred over tables or figures when data are simple
f. Text precedes relevant figures or tables
g. Do not use unrealistic numbers of decimal points: the last decimal place should be the same as your measure of uncertainty (e.g. Figures
h. Data in text are preferred over tables or figures when data are simple
i. Text precedes relevant figures or tables
j. Do not use unrealistic numbers of decimal points: the last decimal place should be the same as your measure of uncertainty (e.g. 2.4456±0.0002 g/L not 2.4456 ±0.2 g/L or 12.2±0.6 g/L not 12.194449±0.6 g/L)
k. Means are reported with variation and are consistent throughout the text (e.g. one of standard deviation, standard error, confidence interval – make sure to specify which and sample size)
l. If differences are significant, direction of difference is described
m. Statistics support statements about the real world, and belong after them, usually in parentheses
n. Reference null and alternative hypotheses unnecessary
o. Statistics always include 1) Statistic (e.g. F, t, r), 2) degrees of freedom or sample size, 3) P values
p. Do not include figures or tables that are not specifically referred to in the text
q. Figures and tables containing key results mentioned in text belong in the main body of the paper, NOT Appendices

9. Figures
   a. Captions are beneath figure
   b. Captions describe the content of the figure, including symbols. Captions contain enough information for the reader to understand the table without reference to the text
   c. Means are plotted with variation (e.g. standard deviation, standard error, confidence interval; specify which). Sample size should be indicated in the figure or caption (or if a table provides additional information not shown in the figure it can be included there).
   d. Do not include raw output from stats programs (unless in Appendix)
   e. Axes typically need only three to five labels (check significant digits!)
   f. It is often clearer to label series directly on the graph rather than use a legend (this is not always feasible)
   g. One should plot as much data as possible on a single graph so long as clarity isn’t compromised
   h. Up to six related graphs can be put on a single page so that the reader doesn’t have to thumb through six pages

10. Tables
    a. Captions above table (otherwise see Figures regarding captions)
    b. Column headings indicate units
c. Organize the table so that like elements read down, not across
d. Choose units of measurement so as to avoid the use of excessive number of digits
e. Don’t use vertical lines to separate columns, use horizontal lines sparingly
f. Don’t include raw data except in Appendices

11. Discussion
   a. Links and explains the main findings
   b. Refer to figure/table or subsection heading if it supports your argument
   c. Interpretation of the data
   d. Compares and explains the results relative to other studies
   e. If you mention sources of error, explain how they might have affected your results and conclusions.

12. Summary or Conclusion
   a. Summarize your findings in one to two paragraphs
   b. State the main result and its context
   c. If the results were expected, say so. If your results were not expected, briefly review your interpretation or make suggestions as to what could be done to resolve the inconsistency with what was described in the literature.

13. Acknowledgements
   a. Mention those who helped you collect, analyze or interpret the data

14. References
   a. Follow citation style described by the journal/instructor/course documents
   b. Use authors’ initials, not first name
   c. Include all, and only, references used in text
   d. It is usual to cite the earliest, most authoritative reference (i.e. the first person to ‘discover’ what you are citing). It is not appropriate to cite the course lab manual, nor your course instructors
   e. It is not appropriate to cite references in other documents (e.g. Archibald et al., 2002, as cited in Melhovich, 2008).
   f. Web references should be included only if they are ‘scientific’ sites (i.e. it’s okay to cite a website with refereed technical reports).
   g. “Refereed” articles are to be used whenever possible. These are peer-reviewed through a formal academic process (e.g. in scientific journals, but not popular magazine or most industry or government publications).

15. Data Archives
   a. Locations (concrete landmarks AND UTM or lat/long)
   b. Dates including year
   c. Units of all variables in headings
   d. Methods (e.g. plot sizes, mesh sizes, criteria for sampling,)
   e. Personnel
   f. Above data can be stored: in Excel:
      i. in comments box much in cell A1
      ii. in JMP: in column info box
      iii. in text; in first lines
g. files should be stored in both text format and Excel or JMP.

h. Information should be provided in such a way that a stranger from a foreign land would be able to read and understand your study and results and use your data to populate a database if necessary.

16. Common Writing Errors

a. “data” is a plural word: “Data were collected”, “These data…”

b. Know the difference between ‘effect’ and ‘affect’

c. Paragraphs should be less than a page long, double-spaced, with a topic sentences and one main idea

d. Provide the scientific name of organisms (plants, animals) after their first mention in the text. PAY ATTENTION TO SIGNIFICANT DIGITS when reporting data.

e. One should avoid motherhood statements (i.e. “Water is important to life”)