Instructions and Format for Writing

Lab Exercise Reports

Designed for classes in

Forestry and Natural Resources, and
Environmental Management and Protection

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Approved for Use in This Class
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I. The Basics of Lab Exercise Reports and Problem Set Preparation

This document addresses the preparation of three types of lab exercise reports:

1. Lab Exercise Reports when data are measured or collected
2. Lab Exercise Reports when a presentation is required
3. Lab Exercise Reports for quantitative problem sets

There are similarities and differences among these. This section of the document discusses the similarities, and the information provided here is required regardless of which type of report is requested by your instructor.

Writing: Your writing should be in full sentences and easily understood. It should conform to the conventions of standard written English (sentence form, grammar, spelling, etc.). Good writing is as important in science as it is in other disciplines because one's ideas have little impact, no matter how important they may be, if they are not well communicated. One reason for emphasizing clarity is that writing and thinking are closely related; as many people have said, "fuzzy writing reflects fuzzy thinking." When people have difficulty translating their ideas into words, they generally do not know the material as well as they think.

Audience: Write the report as if you were writing to other students who are taking a similar course but have not done this exercise. Assume that they have some familiarity with the subject matter but no expertise. Do not write specifically for the instructor.

Author: You are the author of the report. This means that the entire written portion of the report is in your words and developed from your mind. Writing is not a group effort or collaborative project. See statement on plagiarism.

Field/Lab Work: Depending on the situation, you may be working alone or in small groups. When in small groups, the entire group is expected to help and therefore end up with the same data. You may even wish to work together on spreadsheet data analysis. However, every member of the group is expected to know how to develop and write the spreadsheet.

Figures, Tables and Maps: Specific instructions are provided for the preparation of figures, tables and maps. They immediately follow this section.

References: Citations should be made with a standard scientific format (not by footnotes); cite the author and date of publication only, so that a quick look at the Literature Cited can provide the reader with all necessary information. When there are more than two authors, simply list the first author and et al., along with the date. In most cases, do not use direct quotations from the references; paraphrase information and give credit to the source of the idea.

Direct quotes are only allowed for short phrases and even occasional sentences. If you are quoting another's work, including your instructor's, you must show proper quotes and indicate source of that material. In the narrative, you will normally reference another's work parenthetically: "Jones (1999) found the…," or "…of the stream discharge (Dietterick et al., 2001). The full reference would be listed under Literature Cited at the end of your report. See examples on the next page.

Assignment vs. Report: The lab exercise assigned should be considered the "plan." This is how the instructor hopes the exercise will be conducted. There are many reasons it might be altered (equipment failure, weather conditions, mistakes, etc.). Regardless, your job is to discuss both the "planned" approach as well as clearly state what you actually did, and explain the differences.

Academic Honesty: Write everything in your own words. You must cite all sources of information; not doing so constitutes plagiarism. This includes citing your textbook, any/all outside readings, and even your lab handouts. Although you may be collecting data and making figures and tables in teams, we expect that final interpretations, and all writing will be done individually.

You should list a reference for every idea not your own. Plagiarism is more than copying material word-for-word; it is also using someone else's ideas or phraseology without giving reference to the other work or other person. Fortunately, the reference format is so simple that it is easy to include references to all the work that one has used. If the idea is not published but is provided by someone else, give the reference as a personal communication (D. Piirto, pers. comm.).

Be aware that using material from another source and changing only a word here or there without acknowledging the source is plagiarism, even though the statement may not be word-for-word the same as in the

original. Just remember the basic rule: list a reference for every idea or statement not your own.

Word Processing Basics:

· Font: Times New Roman, 11 or 12 point

· Margins: left=1.5"; all others= 1"

· Line Spacing= double

What to Turn In:

1. A hard copy of your report
2. A digital copy (excluding handouts and hand drawn graphs). Place your file in the "Drop Box" for this class per instructions by your professor.
3. Both must be received before grading will begin.

Lab Preparation:

1. Read ALL lab materials BEFORE coming to lab!!
2. Be prepared with proper field attire, maps, fieldbook, etc. for all labs in the field.

Sources for Lab Report Writing:

This discussion of lab report writing was developed from a number of sources including my own experience. It has also been edited by FNR faculty members. Large sections from these sources were used to compile this section.

Alley, M. 1987. The Craft of Scientific Writing, Prentice-Hall, Inc.

Austin Community College, Austin, TX. Winter 2004. http://www2.austin.cc.tx.us/~emeyerth/results.htm

Engineering Writing Centre, University of Toronto, Canada. Winter 2004. http://www.ecf.utoronto.ca/~writing/.

Green River Community College, Auburn, WA. Winter 2004. http://www.ivygreen.ctc.edu/knutsen/labrepts.html

Hamilton College, Clinton, NY. Winter 2004. http://www.hamilton.edu/academics/resource/wc/bio_lab.html

Houghton Mifflin Company. 2000. The American Heritage Dictionary of the English Language. Fourth Ed.

Katz, M. 1985. Elements of the Scientific Paper, Yale University Press

University of Wisconsin-Madison. Winter 2004. Writing Guidelines for Engineering and Science Students, The Writing Center.

How to Write an Abstract

Abstract -- A brief summary of the content of a book, article, speech, report, dissertation, etc. In scholarly journals, the abstract usually appears at the beginning of an article, after the article title and author(s) name(s), and before the text.

Writing an abstract. An abstract has certain features:

- It is always short, usually less than 200 words in length.
- It is always written as a single paragraph
- It is written for the same audience as the article, so it uses the same level of technical language.
- They are informative (as opposed to a descriptive abstract) and therefore, it always summarizes the major points of the results.
- It ordinarily summarizes the major points of the materials and methods, and of the discussion.
- It never includes bibliographic citations or tables.

How are abstracts written? The first step is to identify the major point or points of the article. The research methods might be important if they are new or unusual, but if they are standard, they only need to be referred to briefly. Next, write down the conclusions that are drawn from the main points. When you are done, you will have something like this:

1. introductory statement, including statement of the problem to be addressed (includes location)
2. research methodology (described at length only if it is unusual)
3. results or other main points (absolutely essential)
4. concluding statement, telling what the results mean

This is sort of a "mini-outline." Next, turn these points into a paragraph. With abstracts, the bottom line is brevity: They should be as short as possible and still include the important information.
Qualities of a good abstract

An effective abstract has the following qualities:

- uses one or more well developed paragraphs: these are unified, coherent, concise, and able to stand alone.

- uses an introduction/body/conclusion structure which presents the article, paper, or report's purpose, results, conclusions, and recommendations in that order.
- follows strictly the chronology of the article, paper, or report.
- provides logical connections (or transitions) between the information included.
- adds no new information, but simply summarizes the report.
- Don't merely copy key sentences from the article, paper, or report: you'll put in too much or too little information.
- Don't rely on the way material was phrased in the article, paper, or report: summarize information in a new way.

A sample abstract

FIELD, J. P.; FARRISH, K. W.; CARTER, E. A. Soil and nutrient loss following site preparation burning.

Sediment loss and nutrient concentrations in runoff were evaluated to determine the effects of site preparation burning on a recently harvested loblolly pine (Pinus taeda L.) site in east Texas, USA. Sediment and nutrient losses prior to treatment were approximately the same from control plots and pretreatment burn plots. Nutrient analysis of runoff samples indicated that the prescribed burn caused increased losses of N, P, K, Ca, and Mg from treatment plots. Preliminary results indicate a significant increase in sediment concentration and sediment loss following the prescribed burning application. The data indicate a gradual decline in sediment loss and nutrient concentration over time from treatment plots with respect to control plots. Sediment loss following treatmen was within the range of sediment loss for an undisturbed forest in the south. Source (with permission): www.cabi.org/publishing; cabi-nao@ cabi.org.

Sources:
http://leo.stcloudstate.edu/bizwrite/abstracts.html. This page was originally written by Judith Kilborn for the Writing Lab at Purdue University. It may be copied for educational purposes only. If you copy this document, please include our copyright notice and the name of the writer. © 1995, 1996, 1997, 1998 The Write Place.

Clark, Curtis. 2001. BIO 190 - Writing an abstract. California State Polytechnic University, Pomona, http://www.csupomona.edu/~jcclark/classes/bio190/abstract.html

How to Write an Introduction

An Introduction includes the following parts:

1. A general introduction to the topic you will be discussing. This is to establish a frame of reference for the reader. The introduction should inform the reader of your paper's general topic. It must state the SUBJECT (start at the edge of what your readers know).
2. It should include a small amount of BACKGROUND information about the history or theory of the subject.
3. It states the PURPOSE of the document clearly ("The purpose of this report is --"); this should tell them WHY you are writing about this subject.
4. It defines the PROBLEM to be addressed (readers must understand how you view the problem to understand your approaches, solutions)
5. It explains the SCOPE of the document (the emphasis, boundaries, organization, location. Keep this section brief (don't turn it into an abstract of your report).
6. It doesn't include information that is too general or that is peripheral to your purpose. Ask yourself, do my readers need to know this in order to understand this report?

How to Write a Conclusion

A report conclusion

1. emphasizes the document's most significant data and ideas (usually summarizes the most important information in each section)
2. often offers an evaluation or judgment
3. usually recommends a course of action (or offers a challenge)
4. often speculates about the implications of your ideas
5. if possible, returns to your opening to establish a sense of unity and of closure
6. avoids ending with a cliche or introducing a new idea. *http:/;/web.mit.edu/*

II. Figures, Tables and Maps

Figures:

1) Figures must be cited in the text. If you do not refer to (i.e., cite) a figure in the text, the figure does not belong in the paper.

2) Figures must be numbered consecutively in the order in which they are cited in the text.

3) Every figure must have a caption that tells the reader what is plotted and what the main point of the figure is. Figures should be independent of the text; that is, a reader *should* be able to comprehend a figure by reading the caption and studying the figure. Never use "*see text for explanation"* as a figure caption.

4) Every figure must have a page number; these may be hand-written.

5) At the end of your figure caption you should cite the source of your figure unless you made it yourself. For example:

Figure 1. The relationship between drainage density and discharge for a small watershed in the central Appalachian Mountains (from Leopold and others, 1973).

Note that the term "from" in *from Leopold and others,1973* (above) indicates that the figure is an exact reproduction of the figure in Leopold and others (1973). Alternatively, the term *after* is used to indicate that the figure has been modified from its original form, e.g., after Leopold and others 1973.

6) If you cite the source of a figure, that source must be listed in your Literature Cited section.

7) Figures should be interspersed throughout the text as close as possible to the point at which they are first cited. Figures should share a page with text wherever possible.

Tables:

A table is not a figure!! Tables contain data in rows and columns, whereas figures are graphs, plots, sketches, photographs, maps, etc. Do not confuse the two. In addition, tables:

1. must be numbered consecutively in the order in which they are cited,
2. must be cited in the text (see *1st comment on figures*),
3. must have a caption at the top of the Table,
4. must have a page number; these may be hand-written, and,
5. all of the raw data must be included on a table(s) in your report.

All tables and figures should be titled and numbered sequentially, and the axes should be well labelled with clearly marked units. In addition to the title, each table and figure should have a caption (1 to 3 sentences) which explains what is being presented.

Remember, if the whole thing can be typed, it is a table; if lines have to be drawn, then it is a figure.

Source: Union College, Schenectady, NY. www.union.edu/public/geodept/courses/geo113/labreportsguidelines.

Example Figure (graph)

Size of graph is 1/3rd page or larger

Title

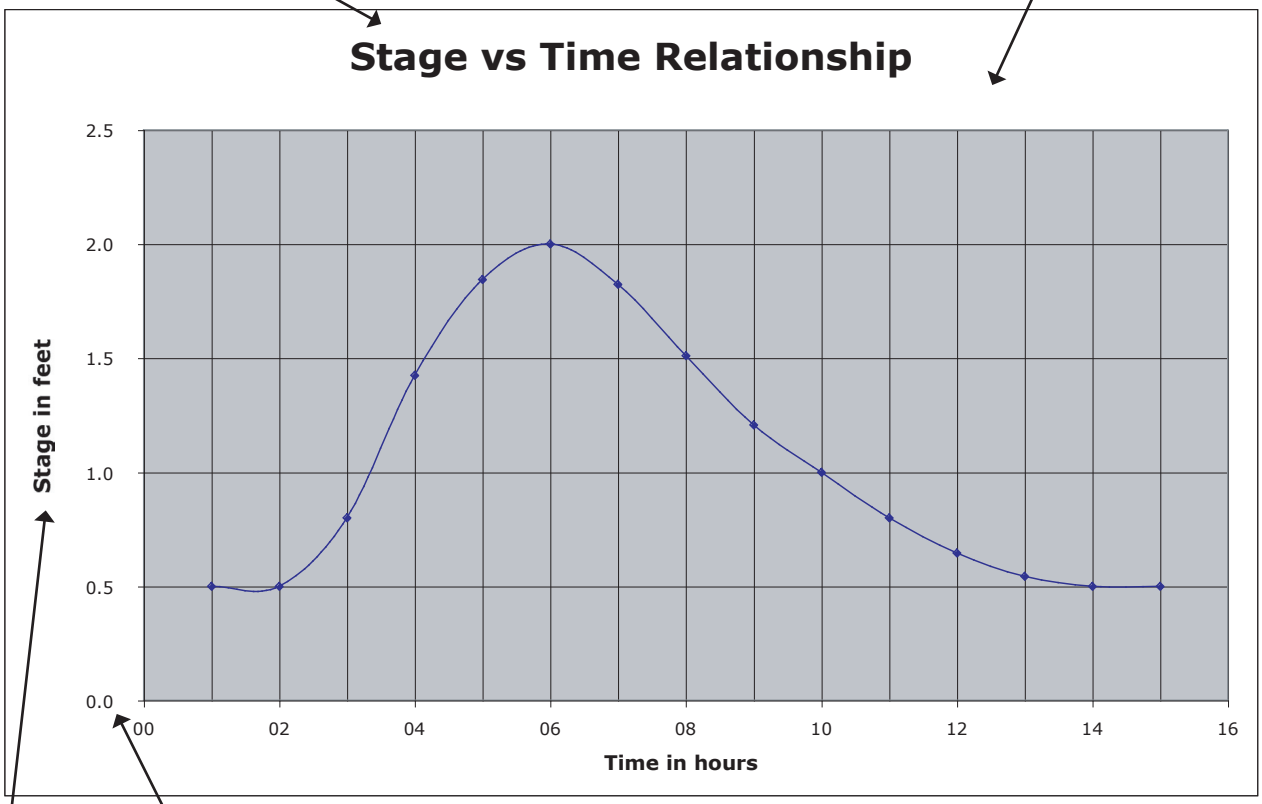


Figure 4. The relationship of stage over time for San Luis Creek.

Axes labelled and with units

Axis numbers are of fewest decimal places necessary, and the decimal point is lined up.

Figure is referenced in narrative. Caption goes at bottom.

Note: Figures turned sideways on a single page layout MUST face away from the binding.

<u>Font sizes:</u>
Title is 18 point
X, Y axes are 14 point
Axis numbers are 12 points or less

Example Table

Table is numbered and referenced in narrative. Caption goes at top.

Tells what and where

Columns have labels and units

Table 1. Velocity Area Method for Determining Streamflow in San Luis Creek, San Luis Obispo, CA.

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Vertical Number	Dist from zero (feet)	Total Depth (feet)	Velocity at point (fps)	Width (feet)	Area (sq. ft.)	Q (cfs)
1	0.00	0.00	0.000	0.00	--	--
2	1.00	1.00	0.190	1.50	1.500	0.285
3	2.00	2.20	0.930	1.00	2.200	2.046
4	3.00	2.60	1.350	1.00	2.600	3.510
5	4.00	1.40	0.250	1.50	2.100	0.525
6	5.00	0.00	0.000	0.00	--	--
7						
8						
			Totals =	5.00	8.400	6.366

Velocity (uncorr) fps (Q_u/A) =	0.758
Correction factor =	0.980
Velocity (corr) fps =	0.743
Discharge (corr) cfs (V_c x A) =	6.239

Velocity (corr) mps =	0.226
Discharge (corr) cms =	0.177

Numbers are ALWAYS lined up by the decimal point!

Numbers are ALWAYS moved away from column lines.

Note: Tables turned sideways on a single page layout MUST face away from the binding.

Example Map

Title (largest font; bold)

Border

North arrow (may need to show declination)

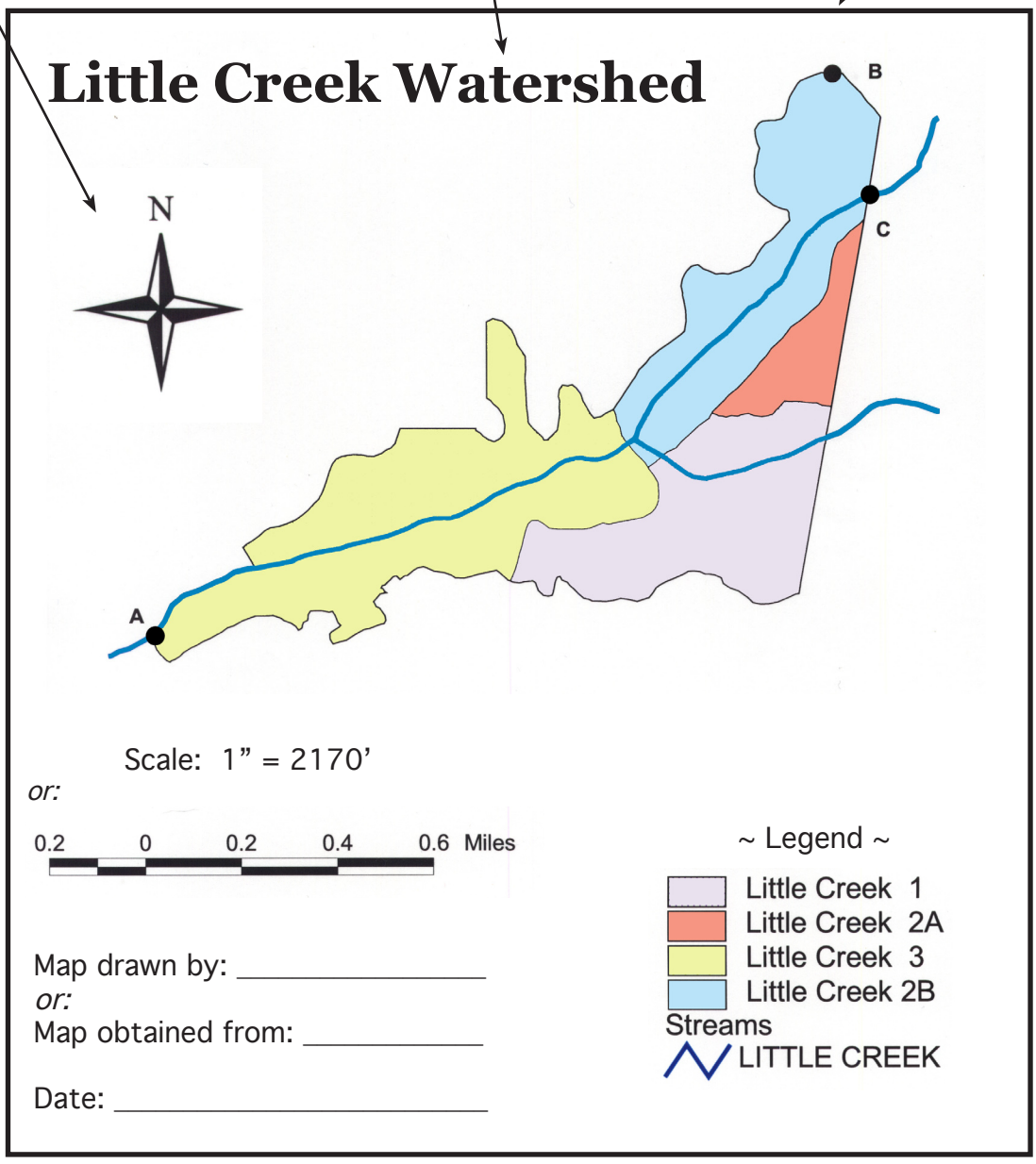


Figure 1. Little Creek Watershed, Swanton Pacific Ranch, Santa Cruz county, CA.

NOTE: As a minimum, these items are to be included on all maps: (1) Title, (2) Who drew it or where map was obtained from, (3) Date map was drawn or presented, (4) Legend showing all relevant map features, (5) Scale, (6) North arrow, (7) Figure caption, (8) Border. The map should be "balanced," without large empty spaces.

III. Lab Exercise Reports (when data are measured or collected)

The following format is the REQUIRED "standard" format, however, small deviations may be made during the lab as needed to fit the situation. Don't hesitate to ask if you have questions about form or content. Above all, remember to write with precision, clarity, and economy. The report must be word-processed. Neatness and clarity are almost as important as clarity of thought.

Required parts of the report are:

I. Abstract, Cover Page, and Table of Contents. Include the items shown in the figure below. A border around the first page looks nice. The title may be verbatiem with what was assigned. All pages must be numbered and sections shown in the Table of Contents. See earlier section on writing an abstract.

II. Introduction and Purpose. Introduce the lab exercise. This should explain what the "title" is talking about, the location of your project, and impart the general idea of what the report covers. It should define the subject of the report.

State the purpose of the lab. This is a general statement about what you are going to accomplish, or hope to accomplish through this exercise. The purpose is a broad statement or plan of what you intend to achieve. It should also help answer the question of "why" you are doing the lab. See earlier section on writing an Introduction.

This section should take some thinking, and should not be copied from your lab manual or text book (although both would be good sources for information and remember to cite them if they are used). Remember: write your own introduction.

III. Objectives of the Lab. State the objectives of the exercise. An objective is a course of action one intends to follow. It is an aim that guides an action, and it refers to what one plans to achieve. Only list the main 2 or 3 objectives. For example, "The objectives of this lab exercise are to:

1. evaluate the vegetative differences between north and south facing slopes in the Horse Canyon watershed,
2. etc,

IV. Methods and/or Observations. Tell what you did, and how you went about it. What procedures did you follow. What measurements did you take. What equipment and materials did you use.

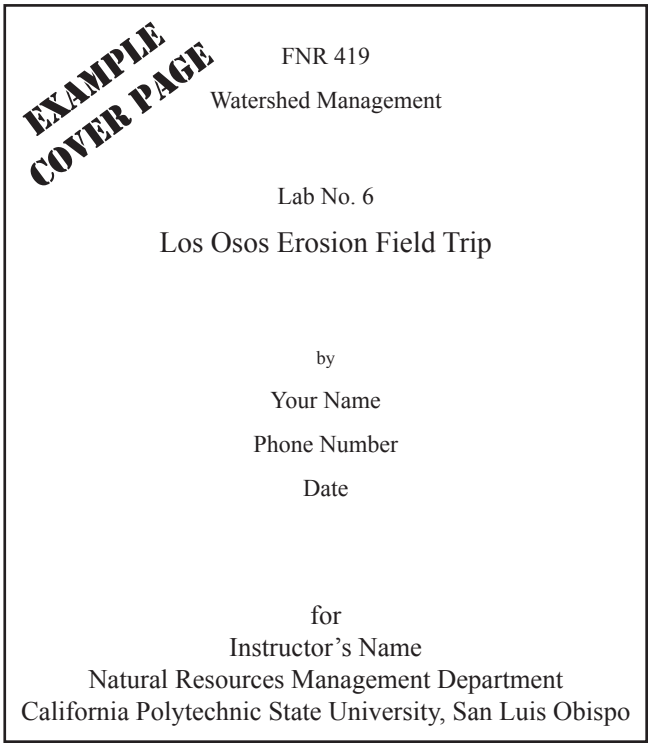
This section should review the methods that you used and explain how you made your measurements and how you processed your data. This should not be written in list form; rather write this as a series of coherent sentences. Do not include overly obvious things like: "and then readings were entered into our spreadsheet." Don't expand needlessly.

Do note any differences in the procedures you actually followed from what was specified in the lab directions. Do not include results here. Clearly, but briefly, describe in a step-by-step fashion the procedure used for the exercise.

It should be obvious that your methods were aimed at meeting your objectives, written in part III.

The passive voice is often used in the Procedures and Results sections. This style of writing is used to convey that the researcher was impartial and objective when performing the exercise and collecting the data. Other scientists dispute this rationale and rightly argue that active voice ("I measured the distance…") improves clarity and conciseness. Furthermore, scientists are rarely completely dispassionate in their pursuit of scientific knowledge.

Since both forms are acceptable in our discipline, you will follow the instructions given by your professor.



V. Data Presentation, Findings and Results. Your data and results might be in one or more of the following forms:

a) Tables of data measured/collected
b) Calculations, and/or statistics. Show all computations including any formulas that were used. It is not necessary to show calculations that are repeated over and over. Prepare and show one example and indicate that this calculation procedure was used for the remainder of the calculations.
c) Graphical presentation (charts, pictures, maps, sketches)
d) Results of analysis

A common mistake is to omit the narrative in the results section. All results should be described in a narrative; don't just list measurements. Also, the narrative should be more than just saying, "Table 2 shows the percentage of watersheds over 10 square miles." You should state and explain the actual results, e.g., "Most watersheds in the study area were larger than 10 square miles (Table 2). This is because…" Data must be presented in figures (graphs) and in carefully planned tables, rather than as raw data.

Results and Findings often will reference figures (which should be numbered as Figure 1, Figure 2, etc.) or tables (also numbered - Table 1). You should only report the results that you obtained, not what should of happened. In addition, this is not the place to describe the significance of the results. See section on Figures and Tables.

VI. Interpretation and Discussion. In this section the results and findings should be interpreted and their significance explained. You should relate the results to the objectives described in the Objectives, part III.

You should also include any difficulties or problems that you experienced with the results and what might you change if you were to repeat the lab to avoid these problems. This section allows you to demonstrate that you understand the lab and are not just simply following a set of instructions.

You may provide more than one possible interpretation of the data set and you should explain why one explanation is better than another.

Indicate how confident you are of your results. What are the major sources of error? What is the size of your error? Discuss any possible errors that may have occurred during the exercise. How did these errors affect your results? How could the exercise be improved?

Include answers to any assigned questions (be sure to restate or paraphrase the question) and/or analysis of your results, but only after you provide your own Interpretation and Discussion.

VII. Conclusions. Conclusions must tie back to your objectives. What did you conclude from the exercise. Use your data to support/substantiate your conclusion. State this in your own words.

Example: "One objective was to evaluate the vegetative differences between north and south facing slopes in the Horse Canyon watershed. Based on the results of this study, I found that north facing slopes are… and south facing slopes are…"

"From this exercise, I learned that the differences between north and south facing slopes do exist, specifically, …"

What did you learn? What conclusions can you draw from the results of this lab assignment? If there are management implications, state them and explain your thought(s). The direction of this discussion depends on the exercise, but where appropriate, it should include: advantages and disadvantages, strengths and weaknesses, and pros and cons.

VIII. Literature Cited. List any publications referred to in your paper alphabetically by first author; do not number them. Every item in your bibliography should be referred to in the body of your paper, or it shouldn't be listed. If you use information from an intermediary source, you should list the original reference but should also note the intermediary: "...cited in...".

IX. Appendix. You may use appendices to include your laboratory handout, sample calculations, sets of raw data, etc. Include your rough notes from the source of information. Each appendix must have a name and a page number. You may number your pages consecutively throughout the report including appendices, or give each major appendix it's own numbering system. For example, Appendix A-1, Appendix A-2, etc.

IV. Lab Exercise Reports (when a presentation are made)

Examples of when to use this format: field tours, guest speakers, look and see type of presentations.

The following format is the REQUIRED "standard" format, however, small deviations may be made during the lab by your instructor as needed to fit the situation.

If several "stops" are made on a tour, write up each stop as a separate exercise, unless otherwise instructed.

Required parts of the report are:

I. Cover Page, and Table of Contents. The cover page should include the items shown in section III. A border around the first page looks nice. The title may be verbatiem with what was assigned. All pages must be numbered and sections shown in the Table of Contents.

II. Introduction and Purpose. Introduce the lab exercise. This should explain what the "title" is talking about, the location of your project, and impart the general idea of what the report covers. It should define the subject of the report.

State the purpose of the lab. This is a general statement about what you are going to accomplish, or hope to accomplish through this exercise. The purpose is a broad statement or plan of what you intend to achieve. It should also help answer the question of "why" you are doing the lab. See earlier section on writing an Introduction (only include relevant points).

This section should take some thinking, and should not be copied from your lab manual or text book (although both would be good sources for information and remember to cite them if they are used). Remember: write your own introduction.

III. Objectives of the Lab. State the objectives of the exercise. An objective is a course of action one intends to follow. It is an aim that guides an action, and it refers to what one plans to achieve. Only list the main 2 or 3 objectives. For example, "The objectives of this lab exercise are to:

1.listen to a presentation about salmoid behavior in Scotts Creek, Santa Cruz, CA,
2.etc,

IV. Procedures/Methods

a) Describe the methods that you obtained information for the topic (lectures, field tours, videos, etc).

b) Provide a reference (and/or citation) for this information.

c) If a verbal presentation was given, give name and title of speaker, title of talk, date given, company the person works for, and how they can be contacted.

d) If the information came from a written source, give author, date, title, reference to location of material, publisher, and page number.

e) Include your rough notes from the source of information and attach as an appendix to your report

V. Presentation Content

a) Provide a comprehensive narrative of the information received. This should be in some systematic order (chronological, or structured by logical categories). This will be in your own words.

b) Emphasize key points by underlining or using bold face text.

c) Include pictures, sketches, tables, charts, graphs, maps, etc. as appropriate.

VI. Analysis and Discussion

a) As appropriate, analyze and discuss the information.

b) Indicate, as appropriate, pros and cons, advantages and disadvantages, and strengths and weaknesses of the material covered.

c) Identify problems, recommend solutions.

VI. Conclusions.

a) Summarize and state the main points presented and your conclusions. See earlier section on writing a Conclusion (only use relevant points).

V. Lab Exercise Reports (for quantitative problem sets)

The following format is the REQUIRED "standard" format, however, small deviations may be made during the lab by your instructor as needed to fit the situation.

Problem solutions should be complete, logically organized, with all answers clearly indicated. Neatness is imperative. Unsatisfactory work may be returned to the student to be redone before a grade is assigned. *Each return of a problem set will result in a 20% deduction.*

Field/Lab Work: Depending on the situation, you may be working alone or in small groups. When in small groups, the entire group is expected to help and therefore end up with the same data. You may even wish to work together on spreadsheet data analysis. However, every member of the group is expected to know how to develop and write the spreadsheet.

Author: You are the author of the report. This means that the entire written portion of the report is in your words and developed from your mind. Writing is not a group effort or collaborative project. See statement on plagiarism.

Due Date: Each problem assignment will be handed in at the assigned time at the start of the class period. *Assignments are subject to a 20% deduction for each school day late.*

Presentation of Problem Sets: The following items are to be observed in the preparation of problem sets for class problems assigned to this course.

1. All work must be done in pencil, preferably in 2 1/2 or 3H lead, on 8 1/2" x 11" engineering paper available at the university bookstore. Work is to be done on the unlined side of the paper only.

2. All work must be printed either vertical or sloping. Upper case or lower case letters may be used provided some consistency is shown.

3. Margins are already printed along the right and left edges of the sheet and from the top of the sheet. In the upper left corner box formed by the margins, the course number is to be indicated. The box in the upper right corner is to be divided by a diagonal line. Above the diagonal line the page number is to be shown and below the line will appear the number of pages in the group. (See example).

4. The remaining box above the upper margin is divided into three approximately equal parts. On the left is printed the date, in the center the student's name, and on the right, the appropriate problem number and page if from a textbook problem.

5. Start with the "*Title*." Often this can be verbatiem with the title provided by your instructor. It should broadly describe the project at hand.

6. First, address the "*Objective and Purpose*" of the exercise. What are you trying to achieve? Why is the purpose of doing this problem?

7. Next, each problem should begin with the word "*Given*", followed by a complete statement of all the known facts of the problem.

8. A "*Sketch*" should be included ***whenever*** possible to facilitate interpretation of the problem.

9. The word "*Find*" should be followed by a statement that specifically states what the final answer(s) will address.

10. If specific *"Methods or Procedures"* were used in this assignment, be sure to state what they were.

11. The "*Solution and Results*" section follows. All computations should be shown and answers clearly indicated by underscoring. An arrow from the margin to the answer should be marked in the margin, with the appropriate symbol for designation of the answer. The answer should also be underscored by a double line. Units for all answers and sub-answers must be included. This will likely involve discussing the procedures that you followed in arriving at your results.

12. Next, is the "*Interpretation/Discussion*" section. In this section the results and findings should be interpreted and their significance explained. You should relate the results to the objectives and purpose description.

    You should also include any difficulties or problems that you experienced with the results and what might you change if you were to repeat the lab to avoid these problems. This section allows you to demonstrate that you understand the lab and are not just simply following a set of instructions.

You may provide more than one possible interpretation of the data set and you should explain why one explanation is better than another.

Indicate how confident you are of your results. What are the major sources of error? What is the size of your error? Discuss any possible errors that may have occurred during the exercise. How did these errors affect your results? How could the exercise be improved?

Include answers to any assigned questions (be sure to restate or paraphrase the question) and/or analysis of your results, but only after you provide your own Interpretation and Discussion.

13. "*Conclusions*" is the last section. Conclusions must tie back to your objectives and purpose. What did you learn? What conclusions can you draw from the results of this lab assignment? If there are management implications, state them and explain your thought(s).

    The direction of this discussion depends on the exercise, but where appropriate, it should include: advantages and disadvantages, strengths and weaknesses, and pros and cons. Use your data and analysis to support/substantiate your conclusion. State this in your own words.

14. You are encouraged to use word processing and spreadsheets where appropriate. Examples of computer generated information that you may want to cut and paste onto your engineering graph paper include data sets, statistical analyses, charts, graphs and discussions. Alternatively, you may do the entire report on the computer as long as the format stated here is followed.

15. The problem is concluded by a double horizontal line across the entire page. Succeeding problems will follow this pattern.