Laboratory Short Report Process

A laboratory short report is a genre or category of writing that aims to provide a summary of the goals,
methods, results, discussion, and conclusions of a set of related experiments. The length is intended to be short enough that a busy technical professional (e.g., your supervisor in an engineering firm) can read the entire document, but long enough that all essential results and analyses are presented in enough detail that they can be understood and evaluated.

In this class, the expected length of the laboratory short report is at least 4 and no more than 5 pages
(single-spaced, 11- or 12-point font, one-inch margins on all sides). These pages include any figures and
tables needed to help convey information. Additional pages not counted in the 4 to 5 pages are a Cover
Page (title, course name, experiment performed, date of report, and author), a separate page presenting the Abstract (150 words) and Acknowledgments, a separate page or pages with a list of References, and any (optional) Appendices.

Writing an effective short report is challenging and requires careful consideration of detail versus length.
An effective short report will present a narrative that captures the reader's attention, builds suspense, and provides resolution. To achieve this goal, in this course we will follow a process for developing the
laboratory short reports.

I. Prepare answers to the following questions before starting to write the report.1. Who is your audience?In 318L, we will assume that the short reports are intended for an audience with a scientific or
engineering background. With this knowledge, you can adjust the level of detail that is appropriate to
include in providing context for the work and reporting technical results.

2. What is the content of your opening?Prepare a few brief statements (e.g., bullet points) that summarize the context of the work you are
describing. In answering this question, you will also need to consult references that contain relevant
information. These references should be noted for inclusion as citations as the report is written. The
statements listed here should provide background information that allows the reader to understand the
significance of your topic, leading to the next question...

3. What question will your report answer?The question may also be formulated as a hypothesis, though that step is not necessary for this class.
Within the length constraint of a short report, it would be unusual to pose more than one question to be
answered, as the answer will require enough supporting detail to be convincing to your audience. Note
that the overall question you intend to answer in your report is probably not the same as an objective of
the experiment.

4. What steps did you take to answer the question?Prepare a set of brief statements (e.g., bullet points) that provide a high-level summary of the approach
used to develop an answer to the question of Step 3. The level of detail needed should be guided by the
expected knowledge of the intended audience. You may find that the steps taken to answer the question are closely related to the objectives of the experiment. Note that this section should not be a detailed stepby-step list of actions done in the laboratory. There is not enough space for this information and your intended audience does not need that level of detail to understand what you did.

5. What results did you obtain?For technical reports, an effective method of organizing the results at this stage is to develop figures,
tables and, if needed, equations that present the results. Each figure and table should present information that illustrates one or more of the key results of your study and also include information on the uncertainty of each result. Given the length constraints of a short report, you will need to carefully consider how to develop the set of figures and tables that present your results in a concise, clear and well-organized manner.

6. How did you interpret your results?Briefly list (e.g., bullet points) or diagram the interpretation or analysis of the results within the overall
context of your question as presented in Step 2. The progression of your ideas should show how you used the factual results reported in the figures and tables to develop an answer to the question of Step 3. Your argument should be logical, based on the results, and also include consideration of the uncertainty in the results.

7. What's your answer?Your investigation has now found the answer to the question posed in Step 3. As in any good mystery
story, suspense has built as you've moved through the process of figuring out what steps are needed in
your investigation, what the results of those steps are, and how these results can be put together with one another and interpreted. Now, resolve the suspense and just answer the question!

8. What's the sequel?Most stories have some aspects that are left unresolved or even raise entirely new questions. Provide a few brief statements of unresolved or additional questions that would be interesting for future investigations.

II. Initial RevisionsOnce all the above questions are answered, go back and carefully consider the set of answers that you've developed. What revisions are needed to improve the story? Does the story make sense? Will the
expected audience be able to follow along? Is there too little information presented to support the answer, or is there so much information presented that the reader may have trouble following the story? Are the figures and tables effective in presenting the results? Have you gathered up all the references necessary to support the story? If possible, show your answers to some colleagues and ask if they can follow along? Are they convinced by your answer?

Based on these questions, make revisions to the material you developed in answering the eight questions above.

III. First Written Draft

Prepare the first written draft of the report, following the template below, but focusing on the key sections of Introduction (answers to Questions 2 and 3), Methods (answer to Question 4), Results (answer to Question 5), Discussion (answer to Question 6, building to the answer to Question 7), and Conclusions (answers to Questions 7 and 8). The first draft will usually include the figures as they provide the framework that some of the text will be built upon. References and citations can also be inserted if convenient, but don't let these steps interrupt the flow of developing the text. Although it's possible to edit later for small changes in length, it's generally best to keep length guidelines in mind as you are preparing the first written draft. Your text will normally closely follow and just expand upon the answers to the questions that you've already written down.

IV. Peer Evaluation and Feedback.One week after the post-lab calculations are submitted, students are expected to have completed Steps I and II and be partway through Step III. They should bring to the Peer Evaluation and Feedback Process
meeting two printed copies of the material they have prepared, which should present the answers to all
questions of Step I in the context of a report organized according to the sections found in the Report
Format below. A substantive effort and meaningful participation in this process will contribute to the
Course Participation component of the overall grade.

V. More Revisions.Set aside the text you've written and come back to it at a later time. Read through and ask again questions similar to those of Part II. Is the story compelling? Will the organization make sense to the reader? Is there enough information presented to support the answer? Is there too much information presented, possibly confusing the reader? Do the new questions being posed fit in the context of the problem? Are the figures, tables or equations effective when embedded in the text? Use the answers to guide high-level revisions such as removing, combining or adding figures, moving paragraphs, inserting or deleting equations. As this step is completed, it's also a good time to start more detailed copy editing, checking for clarity of expression, overly complex or lengthy sentences, consistency of symbols and abbreviations, content of figure captions or table titles and notes, citation formatting and so forth.

VI. Final Revisions and Edits.Complete the Cover Page and Abstract, add all remaining needed Citations and References, double-check formatting and location of figures, tables, and equations, verify length is within guidelines, add (optional) Acknowledgments, add (optional) Appendices.

VII. Submission.Submit the final report as a pdf file through the UNM Learn system before the submission deadline.

**Laboratory Short Report Format**

1. General

Use a standard 11- or 12-point font such as Times New Roman or Calibri (the content of the Cover Page
can be in larger font size). Use one-inch margins on all sides. All pages should be numbered sequentially,
starting with Page 1 on the Cover Page. The use of any pre-formatted MS Word styles is strongly
discouraged. The report should be single-column and single-spaced. Add a small amount of vertical space (e.g., 6 to 12 points) between paragraphs. Each section of the main body of the report should start with a numbered boldface title on a separate line (e.g., **1. Introduction.**).

2. Figures and Tables

Figure and Tables should be numbered (e.g., Figure 1., Table 1.). Tables should have a title at the top.
Figures should have a descriptive caption. These elements will be discussed in class, but a good starting
point is to look at examples from textbooks that you use in your engineering classes. Figure captions and
table contents can be in a smaller font than the main text, but usually no smaller than 8 or 9 point. All
content must be large enough to be readable.

3. Equations

Equations should be sequentially numbered and all symbols described in the text. In general, all equations should be offset from the text, as illustrated here:

𝑦 = 𝑚𝑥 + 𝑏 (1)

where *m* is the slope, *b* is the intercept, *x* is the index of refraction and *y* is mole percent. Mathematical
symbols are usually italicized in equations and the text (with vectors or matrices sometimes in bold text). Again, you can refer to textbooks you are using in other engineering or science classes for examples of equation formats.

4. References

References should conform to American Chemical Society guidelines (link Accessed September 8, 2019).
Citations in text can either be superscripted numbers or italic numbers contained in parentheses.
References should be placed on a separately titled page at the end of the report. In the list of references, adding a small amount of vertical space (e.g., 3 pt.) after each item in the list will improve readability.

5. Sections and Points (A detailed rubric is presented in a separate file)

Each short report is worth 120 points. A format for the overall content of the report and the contributions of each section to the total report grade is given below.

**Cover Page** (1 page, 5 points).

Contains title, course name, experiment performed, date of report, and author name.

**Abstract and Acknowledgments** (1 page, 5 points).

Contains an Abstract no longer than 150 words. The abstract should summarize the contents of the report, stating the question answered, the methods used, the results obtained, and the answer to the question. An Acknowledgment section that indicates other individuals who made any contributions to the report should also be included on this page. As a minimum, the acknowledgment statement should indicate contributions made by other team members. Instructors, course assistants or other students should also be acknowledged if they provided any assistance with your report. A typical acknowledgment statement might include: "The author acknowledges Catharine Hubka for helpful discussions that assisted in the preparation of Figure 1. Also, the course assistants for CBE318L helped with the interpretation of results presented in the Discussion section."

**Main Body of Report** (at least 4, no more than 5, pages, organized with the following sections).

**Introduction** (15 points)
Present the context and background of the problem and a statement of the question you intend to answer.
**Methods** (10 points)
Describe steps taken to answer the question, presented at a level appropriate to the intended
audience of the report.
**Results** (25 points)
State results of the study. This section is often organized around figures or tables presented in the text.
**Discussion** (25 points)
Provide your interpretation of the results. What do they mean in the context of the problem and
how do they lead to an answer to the question posed in the Introduction?
**Conclusions** (10 points)
Summary of the original question and the answer provided. Discussion of new questions that have arisen from the investigation.

**References** (10 points).

List references, starting on a separation page (not counted in the 4-to-5 page length).

**Figures and Tables** (15 points).

These elements are embedded in the sections of the main report but will be graded separately.

**(Optional) Appendix.**An Appendix (or Appendices) can be added to the report to provide supporting information or other
material that might be useful for some readers, but which is not necessary for understanding the main
report. Generally, material in an Appendix would be detailed information too lengthy or distracting to
include in the main body of the report. For example, sometimes long mathematical derivations are placed in an Appendix and only the result is stated in the main report. Textbooks often contain one or more Appendices, so you can find examples in some of your textbooks to see what kind of material might appear in an Appendix. No separate grade is assigned to an Appendix, but appropriate or inappropriate use of an Appendix could affect readability and grades of other sections of the report.

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| **Grading Rubric for Laboratory Short Reports (120 total points).(Note: Optional Appendices are not directly graded but could affect grades of other sections of the report)** |
|  | **Main Body of Report – At least 4, no more than 5, pages.Points will be deducted for length outside of these limits.** |  |
| **GradedSections(Points, 120total)** | **Cover Page(5)** | **Abstract andAcknowledgments(5)** | **Introduction(15)** | **Methods(10)** | **Results(25)** | **Discussion(25)** | **Conclusions(10)** | **References(10)** | **Figures and Tables(15)** |
| **90-100% ofpossible points** | • All requestedcontent presentand cleanlyformatted. | • Abstract clearly andconcisely summarizescontent of full reportwithin word limit• Acknowledgmentscomplete and briefly,but clearly, describecontributions ofothers. | • Context ofproblempresented inorganizedmanner at levelmatched toaudience ofreport• Citations usedeffectively tosupportstatements offact• Statement ofquestion clearand concise• Content ofsection directlyconnected tosubsequentreport content | • All steps takento determineanswerdescribed insufficient, butnot excessive,detail (matchedto expectedknowledge ofaudience) | • Resultspresented inorganized andlogical mannerwith effectiveuse of figures ortables• Uncertaintiesin resultsindicated• No off-topicopinions ordiscussionincluded in thissection, just adirectpresentation offactsdeterminedduring theinvestigation | • Presentsdiscussion ofthe meaningandinterpretation ofthe results• Provides acleardescription ofuncertainties inthe results,sources of thoseuncertainties,and howuncertaintiesmight bereduced infuture work• Should buildtoward andpresent ananswer toquestion posedin Introduction,resolving thenarrative of thereport | • Conciselysummarizes thequestion(s) andanswer(s)addressed in thereport• Describespossible futurework related tothe originalquestion orposes importantnew questionsthat developedduringinvestigation | • Effective useof citations intext andcorrectlyformatted andcomplete list ofreferences | • Overall formatting isclear and readable• Information iseffectively presentedand well organized• Makes good use ofcaptions and titles• Informative andreadable axis labels• Consistent use of units• Readable legends,numbering, and symbols |

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| **80-90% ofpossible points** | • Missing oneitem ofrequestedcontent orcontent noteasily readable | • Abstract notmatched to wordlimit• One item ofimportant contentmissing fromAbstract• Acknowledgmentsincomplete or overlydetailed | • One or twomissingcomponents ofcontext• One or twomissing orincorrectcitations• Question notpreciselyworded or notwell posed | • One or twoimportant stepsmissing orpoorlydescribed• Level of detailof methods notwell matched totechnicalbackground ofreport audience | • Sequence ofpresentedresults isconfusing or notclearly ordered• One majorresult missing• Presentationof uncertaintiesconfusing• One or twoaspects offigures or tablesineffective orunclear• Some contentmoreappropriate fordiscussionsection | • Discussion ofuncertaintiesnot complete• Organizationlacks one ortwo elements inmoving towardanswer toquestion• Answer toquestion unclearin minor ways | • Summary ofreport missingone or twoitems• Future workor newquestionsincomplete oroff topic | • Mistakes informatting orsome referenceswith incompleteinformation | • Some figures or tablesmissing key informationsuch as units, axislabels, or captions• A few symbols orlabels not legible |
| **70-80% ofpossible points** | • Missing twoitems ofcontent or lowreadability ofentire page | • More than onemissing importantitem of content inAbstract• Missing orineffectiveAcknowledgments | • Multiplemissingcomponents ofcontext• Numerousmissing orincorrectcitations• Poorly statedquestion notdirectlyconnected tocontent ofreport | • Severalmissing steps orsteps poorlydescribed• Informationprovided isinadequate toallow reader tounderstand theprocessfollowed duringtheinvestigation | • Several keyresults missing• Figures ortables withmultipleproblems• Presentationof uncertaintiesnot correct• Content notwell organizedor not focusedon results | • Discussion ofuncertaintiesincorrect ormissing• Organizationdoes notsupport answerto question• Answer notclearly stated orunrelated tooriginalquestion | • Summary ofresults andanswerincomplete inseveral ways• Little or nopresentation offuture work ornew questionsarising frominvestigation | • Multiplereferences withincompleteinformation• Missingcitations orreferences | • Multiple figures ortables with missinginformation or symbolsor text not legible |
| **<70% ofpossible points**  | Majority or all of above content missing, ineffective, or not readable. |