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Professional Communication: The Lab Report
for Biomedical Engineering Laboratory (BME 307)

The lab report—its professional context

To achieve success, engineers need excellent communication skills. When you embark on your post-graduate career, your employers and clients will expect you to know how to document, relate, and interpret findings from tests of materials, designs, procedures, and complex systems. Thus, writing reports on your laboratory research is an essential part of your professional communication training; good reporting is not optional—it's required. Moreover, lucid documentation of research, both in the laboratory and the field, serves as vital evidence of your engineering competence and credibility.

Criteria for lab reports in BME 307

The laboratory reports you write for this class will be used to evaluate your mastery of the required science and of the key communication skills needed to report and interpret your methods, findings, and interpretation. In each report, your instructor will expect you to accomplish the following tasks:

- Introduce the purpose of the lab and key issues. This means explaining the point of the lab—not just what you did but why and what you found. (This may be different from the format used in other lab courses.)
- Show knowledge of proper protocols for planning and conducting experiments in your methods and materials section. Explain what was done, how it was done, and why. Explain work that goes beyond that in the syllabus.
- Compile data from your investigation completely, accurately, and in readable tables and graphics that clearly illustrate important trends and key findings. Present only significant figures.
- Perform data reduction and analysis (including error analysis), being sure to include pertinent equations, graphics, and figures accompanied by explanations of how they illuminate your findings and the research problem as a whole.
- Describe results clearly and concisely.
- Discuss results and draw logical conclusions, being sure to acknowledge the limitations of your investigation. This section should be written as a prose discussion, not a list of topics. You are commenting on the significance of your results and relevance to the more general problem of data acquisition, not simply restating your results. Innovative ideas should be included.

Your report should include headings and subheadings to mark major sections of the document, use precise terminology, and avoid repetition or simple narrative. Lastly, you should proofread the final document for proper grammar and punctuation, consistent citation formats, and correct labeling and numbering of figures in the text.

Final thoughts

The effort you put into mastering this form will be repaid in many ways over your career. Perhaps most importantly, the good habits of documentation and analysis that you develop in

writing these reports will sharpen your eye as a researcher, making you quicker to spot important trends in your data or recognize significant anomalies in your own work and that of your colleagues.

Some Advice for Writing Clearly and Concisely in Lab Reports

Structure and develop your ideas

- Use headings to signal important sections: Introduction, Materials and Methods, etc.
    - The right kind of material needs to go into each section. For example, figures belong in the Results section, not in your Discussion.
    - Headings should stand out from your body text by being in boldface or underlined.
- Put main ideas at the beginnings of sections and paragraphs. Each paragraph should have a main idea that's announced in the topic sentence and then developed with description, evidence, etc. Paragraphs need to be unified, coherent, and adequately developed. Develop a paragraph by backing up general statements with evidence, observations, and logical explanations.
- Start a new paragraph for a new idea. Use transitional words and phrases to show how paragraphs and sentences are connected (e.g. First, second, third, finally; In addition, also, moreover, furthermore; However, nevertheless, in contrast).
- Help readers follow your ideas by "telling the story."
    - Results need some interpretation; don't just present numbers.
    - If you include figures or equations to develop an idea, introduce them by explaining what point they make; help readers see what you want them to see.

Write clearly so that readers can follow your ideas (see examples after this list of advice):

- Divide text into readable "chunks" – sentences that are not too long (<20 words) or that are divided into bulleted lists or numbered sections.
    - Eliminate wordy phrases.
    - Put subjects and verbs close together.
    - Put verbs toward the beginning of a sentence; put lists and complicated material toward the end.
- Use transitions to show how sentences and paragraphs are connected (e.g. First, second, third; In addition, also; However, nonetheless, in contrast).
- Use periods (not commas) at the ends of complete sentences. In other words, don't run your sentences together.
- Make all items in a list grammatically and logically parallel (that is, all items should be the same kind of "thing" and the same part of speech, like the verbs that begin each item in this bullet list). Also make sure that each item matches the heading used for the list.
- Check all pronouns to make sure they refer clearly to nouns that precede them. It's okay to use personal pronouns (e.g. "we" for talking about what your team did), as long as you're not overemphasizing what your team did instead of what occurred in the lab.
- Use past tense to explain what you did in your Methods section (that work is already done). Use present tense for your discussion, where you're talking about what things mean or suggest.

Use language carefully.

- Use technical terms accurately. (Remember: *data* is plural; "the data are . . . ")
- Avoid vague language.
    - Be specific and precise. For example, don't say "There was a difference between X and Y" if you can found that X was "greater" or "less" than Y and by how much.
    - Use plain, direct language that communicates clearly across cultures and countries.
    - Use jargon and acronyms only with audiences who will be familiar with them. Explain (define) all acronyms.

Follow expected conventions

- Label all graphs and figures.
- Use proper citation format.
- Use correct, conventional grammar.

In team writing, revise for consistency

- Collaborative reports should sound as if they were written by one writer: check voice, point of view, organization, level of formality, etc.