

Date: September 4, 2006  
Memorandum for: PH 315B students  
From: Matt Young  
Subject: Submission of lab reports

You may submit your lab reports in memo format or in report format, or you may present them as reports or scientific papers. See *Guide to Writing as an Engineer*, by Beer and McMurrey. This memo more or less follows the old ANSI standard (Introduction, Methods and Materials, Results, and Discussion) for scientific writing.

**Abstract or summary.** If you use a report or scientific-paper format, you may begin with an abstract or a summary. Please make the abstract or summary informative and give the conclusion or result of the paper.

**Introduction or objective.** Please provide a brief explanation of the purpose of the lab and describe what you did. Give background material, such as a description of previous work, in this section, but only after you have introduced your own work. It sometimes helps to begin, "The purpose of this report is to," finish the sentence, and then erase the words in quotation marks. Do not be afraid to summarize your conclusions or recommendations in the Introduction.

**Methods and materials.** May be 2 separate sections, *Methods* and *Materials*, if you prefer. Please present the theory that underlies the experiment under "Methods" or introduce a "Theory" section or subsection, as appropriate. Describe the materials and the procedures you used. Present a block diagram of the equipment and a wiring diagram.

**Results.** Please describe your observations. Outline the calculation of numerical results (you may show handwritten mathematical work, such as a sample calculation, as an Appendix).

Perform uncertainty analysis as appropriate. In particular, whenever you report an experimental number, estimate its uncertainty (95 % confidence, or 2 sigma). Report each number as a mean value plus or minus an uncertainty ( $\bar{x} \pm 2S_m$  in Baird's notation).

**Discussion.** Please summarize your findings. Compare your results with expected results, such as handbook values. Does the expected value fall within your 95 % confidence interval ( $\pm 2S_m$ )? If not, why not? State conclusions or recommendations.

**References.** Use superscripts to cite references. Number the references in order right after the Discussion section. Please use American Institute of Physics format for the references. If your word-processing program allows it, use automatic numbering of references.

**Miscellaneous.** Please use 12-point type and 1-in margins. Please prepare the memo so that any person who has not been in the lab can understand and perhaps reproduce the experiment. It is acceptable, perhaps desirable, to write in the first person singular (or plural, if there are two of you). Be explicit about calculations or uncertainty analysis; for example, describe the calculations, rather than just saying that the calculation may be found in Appendix 1. Often a handwritten calculation is not clear to anyone but its author.

Please pay attention to details such as correct use of units and significant figures, and correct formatting of Figures and Tables (in scientific writing, there are no graphs or charts, only figures and tables). Refer to Figures and Tables in the text, and attach them to the report in the order in which they appear in the text. You may work them into the text or attach them at the end, as is convenient. Place a clear, explanatory title or caption on each Figure and Table. (By convention, Figure captions are located *below* the figures, whereas Table titles are located *above*

the tables—think “table top”.) Do not show printed data files anywhere in the body of the report; rather add them as Appendixes, but only if you have a need to refer to them in the text. Instead, reduce the data to a few numbers, such as the mean and standard uncertainty, or to a short table. Likewise, do not submit computer programs. In particular, do not use Mathematica calculations as substitutes for well-formatted Figures. Finally, make sure that each axis of each graph is labeled with a physical quantity and its units, and that the  $x$  and  $y$  axes intersect in the lower left corner of the graph.

Treat equations as parts of sentences. Use symbols, not words, in equations (Baird is incorrect in this regard). Define every symbol explicitly (except for  $\pi$ ,  $e$ , and a very few other symbols). Use subscripts and superscripts; for example, write  $3 \times 10^6$ , not 3E06 and not  $3*10^6$ . Use the equation editor for complicated equations. Precede all decimal points with a number, even if that number is 0: 0.76, not .76. Use the correct number of significant digits; in this lab, that usually means 2 (nonzero) digits and no more. Be careful, incidentally, to get the right number of significant digits (usually 1 or 2) on the axis of any graph.

Use symbols, not words, for units: 3000 Pa, not 3000 pascals. Note the space between the number and the unit symbol. Do not pluralize unit symbols or follow them with a period: 70 cm, not 70 cm., and not 70 cms. Use a centered dot to show multiplication:  $9.8 \text{ m} \cdot \text{s}^{-2}$ , not  $9.8 \text{ m s}^{-2}$ , and certainly not  $9.8 \text{ ms}^{-2}$  (again, do not use Baird as a model).

Finally, please provide a sample of each calculation you describe in the text.