Requirements for Lab Notebooks

1. Front of notebook
    a. Name
    b. Course/Section Number
2. Inside front cover
    a. Table of contents: At a bare minimum, this should list the names of the experiments contained in the notebook and their first page numbers
3. For each experiment
    a. Statement of problem
    b. Physics background
    c. Discussion of experimental approach
        i. This should *outline* how you are going to address the stated problem through experiment
    d. Description of experimental setup
        i. List of equipment used, including model numbers or any other identifying marks
        ii. Sketch of experimental setup, with all connections clearly labeled
    e. Discussion of experimental procedure
        i. This should contain as much detail as possible about how you went about making your measurements. Someone else should be able to use your notebook a year from now and be able to reproduce your setup and procedure. Physics experiments need to be verifiable.
        ii. Simply saying "As it says in the lab manual" is not enough.
    f. Raw data
        i. Data should be clearly tabulated in your notebook.
        ii. Make any comments on observations made during data taking that might influence how you use this data in your analysis
        iii. If the data is stored in a file on a computer, be sure to record the file name and location in your notebook
    g. Analysis
        i. This is where you take your raw data and use it to extract relevant physical quantities. This should include:
            1. Plots of your data (if relevant)
            2. Discussion of how your data is used to extract physical quantities, including any formulae used
        ii. The most important part of this section is the uncertainty analysis
            1. For your data, you should state sources of uncertainty in your measurement technique, both systematic and statistical
                a. List sources

b. Give QUANTITATIVE measures of the sources of uncertainties, and how you arrived at these estimates
    i. This may require that you perform other measurements in order to get quantitative results
c. Propagation of uncertainties into the final result
    i. You are welcome to use Mathematica or Excel or whatever to do this for large data samples, BUT…
        1. You should clearly write out the algebra necessary to propagate uncertainties in your notebook
        2. You should show a calculation done by hand for at least one data point to verify that you told Mathematica to do the correct thing
d. You should identify the dominant source of uncertainty in the measurement, whether statistical or systematic, and discuss how this source of uncertainty could be reduced if you were to perform this experiment again

h. Discussion of results
    i. Summarize the measurements made in the experiment
    ii. Compare your measurements with expectations
        1. This should be a QUANTITATIVE comparison, using the uncertainty estimate in your analysis
        2. If your measurement is statistically incompatible with expectation, you MUST discuss possible explanations for this
    iii. List any interesting observations you made during the course of the experiment
    iv. List possible improvements to the experiment (please be more creative than "Buy better equipment")

a. Every page and every entry should be dated
    i. If you go back to a page and add a comment, be sure to date the comment
b. **Write in pen**. If you make a mistake, cross it out with a single line. It should still be legible (it may not have been a mistake after all)
c. Write neatly! Others will have to read your notebook ("others" being those who determine your grade).
d. Cite any references you may have used in preparing the physics discussion, or manuals you may use to help with the equipment.