REPORT FORMAT
You’ll write your lab reports in the format of a manuscript that you would submit to a research journal such as the Journal of Physical Chemistry. Most of the requirements for the report are the same as for Physical Chemistry (CHM3915) lab (the CHM3915 format is discussed in detail on the webpage at http://ux1.eiu.edu/~sapeebles/SP07ReportNotes.pdf). The main difference for CHM4770 reports lies in the Introduction section, which will be much less detailed (although you will need to understand the theory significantly better since you will have a quiz on the theoretical background of each lab!).

General Comments:
1. Length is not equal to quality. The reports do not have to be 30 pages long. Do try to lay it out in a way that is easy to follow – don’t crowd calculations together, spread them out so that they can be understood and followed easily. Be sure to clearly define any terms or symbols that you use in your report – see also point 6.

2. Do not lose sight of the goals of the experiment. If you get stuck, ask yourself, "What is important about this experiment?" and make sure that comes across in your report.

3. Please don’t be afraid to seek help during the process of writing. You can always bring in your draft reports or calculations to discuss.

4. Write the report for a classmate who has a similar chemical background but has not taken this class. Explain what you did and what it means.

5. Make the report readable. Read it out loud if necessary. If it doesn't sound right or if it is not understandable, fix it! Always be sure to read over the final report before submitting it – spelling mistakes and silly errors arising from cutting and pasting in the word processor will reduce your grade and are easily avoidable. (Learn to use the spell checker on the word processor).

6. Reports should be written with a word processor and double spaced. (Equations or calculations may be neatly hand written if you’d prefer).

7. Any time you include a figure, table, spectrum or computer output you must refer to it by number in the text of the report. (Look at any journal article to see examples of this).

8. Always make sure you have included in your lab report anything which is explicitly asked for in the lab handout. Failure to do this will result in loss of points.

The report must consist of the following items/subsections:

Cover Sheet

- Title for the experiment (as given in the lab handout)
- Your name
- Your partners’ name(s)
- Date submitted
1. **Abstract** (about 50-100 words)
   Include a summary of—
   - the physical property measured
   - the chemical system studied
   - the experimental method used (the general method e.g. laser induced fluorescence spectroscopy, Raman spectroscopy, etc., not a detailed description of the complete procedure)
   - the important results with units and errors included
   - a comparison with relevant theoretical or reported values
   - significant conclusions

   Strive for maximum useful information in the minimum number of words. All important results and conclusions should be reported in this section.

2. **Introduction**
   This section should be brief but should put the experiment in context. It must include—
   - the purpose of the experiment (what are you setting out to measure or to prove?)
   - the kind of information gained (what did the measurements tell you about the system of interest?)
   - how the information is obtained (a brief mention of the method or technique being used – include any relevant references)
   - how the results of the experiment may be useful (what information can we get from the measured parameters?)
   - note that the Introduction section does not need to include any detailed theory (unlike the lab reports in CHM3915). We will omit this material from the lab report but the theory of each experiment will form the basis for the quiz that will be given after each experiment. Any important equations used in the analysis of the data may be introduced directly in the Results section (section 4, described below).

3. **Experimental**
   This section should also be brief. You should aim to give enough information so that someone else could repeat your experiment.

   Things to include—
   - Simply refer to the lab handout in footnote form as a personal communication from your instructor and include it in your references – include the date. You don’t need to repeat what’s in the lab handout.
   - **Describe completely and in detail any changes to the referenced procedure**.
   - State the number of runs and the conditions of the experiment (e.g. temperature, pressure).
   - Include the names and makes/models of any equipment that you used in the measurement of your data. Also include a basic block diagram to show how things were arranged/connected.
4. Data and Results (with Error Analysis)

Include, wherever applicable:

- Tabulations of data and results from the calculations. Clearly label columns with defined parameters and units. Fix the number of significant figures reported by a spreadsheet program (by hand or in the program). Please see me if you have any problems with (or are not familiar with) Excel. An introduction to some of the features of Excel is available on the course web page (http://ux1.eiu.edu/~sapeebles/chm4770.htm).

- Graphs. Include a descriptive title, label both axes and include units. If the graph includes data and a best fit to an equation, be sure that there is a legend explaining the symbols used. Display the equation used to fit the data, with the parameters determined by the fitting procedure and their associated uncertainties. Be sure any equation on your plot displays the required significant figures (for instance, if you fit a straight line and obtain a slope of 4.623(1) × 10^{-3}, it is not of any use whatsoever if you allow Excel to display the equation on the graph as 5E–3 since this loses 3 orders of magnitude in precision). Remember, Excel is completely stupid when it comes to significant figures.

- Spectra. Include a title and label the axes with units. Spectrometer settings (number of scans etc.) and other relevant details (such as temperature or pressure) should be included in the Experimental section. You can write on any important assignments or other annotations neatly by hand.

- Sample calculations. Include an easy to follow sample of each one of your calculations (these, like all equations, may be neatly written in by hand if you prefer). This is important for things like showing how you derived and propagated your uncertainties.

5. Discussion

- Critically assess your experimental accuracy and precision. How might these be improved? Identify possible sources of error along with the effects these may have had on your results e.g. changes in the temperature (leading to an increase in the pressure in the reaction vessel etc.)

- Assess agreement with other literature values (remember they also have errors (they’re not perfect – they may even be less precise than your own measurements!)). Be careful to include details on the level of calculation (i.e. level of theory and basis set at the very least) if you are comparing with theoretical (computational) results. Don't forget the references. References can be in footnote form (given at the bottom of each page), or in a bibliography at the end of your report.

- Discuss your results in relation to the literature errors, i.e. do the results agree within the listed uncertainties? If not, why not?

- Assess the validity of any theory.

- Place your results in a wider perspective. What do they actually mean? Do they offer any physical insight into a particular chemical process?

- Finally, always remember to address any questions posed in the handout but do so in a manner consistent with your discussion.

6. References

All references should be in ACS format and referred to by number in the body of the report.