

Chemistry Department Writing Plan
January 2004

This document outlines the writing plan that has been implemented by the Chemistry Department with the goal of helping our majors develop strong writing skills. Our approach takes advantage of the hierarchical nature of the chemistry program to teach the components of good scientific writing in a progressive manner, beginning with General Chemistry and culminating in Senior Seminar. Two over-arching aspects unite this step-by-step plan. First, we will communicate to our students at all levels that we value writing skills as much as the mathematical, technical, and other skills they will master as chemists. Second, we will make our specific expectations and requirements vis-à-vis writing explicitly known to the students at the beginning of each course. We feel that both of these efforts are needed to create an environment in which science students will truly embrace the rigors of learning effective writing.

In the first year of the major, students take Chemistry 153 and 154, our versions of General Chemistry. While these courses are already packed with a large amount of vital introductory material, we plan to make time for writing exercises. The students will engage in informal writing with “minute papers,” which provide a quick summary of what the students learned during class. The benefits to the instructor are obvious, and these papers give students a chance to express scientific ideas in writing. Students keep laboratory notebooks in both Chem 153 and 154. These notebooks by necessity include a great deal of data and calculations, however, the *Introduction* and *Conclusions* sections provide an opportunity to stress clear, concise, grammatically-correct writing. In the second semester, students give presentations on a chemistry subject of their choice. We will require that students write an abstract of their presentation, so that they can become familiar with this important part of scientific writing. In these ways, the first year will lay emphasis on a few of the components of a scientific paper: abstract, introduction, and conclusions; these sections will be reinforced and added to in subsequent years. Further, the presentations will begin to familiarize students with library research.

We point out that keeping clear, concise and thorough lab notebooks is essential for chemists. A well-written lab report allows a student to repeat any experiment directly from his or her notes, to see easily what problems arose, and to understand how the experiment was successful. However, a lab report is not the same as a scientific paper, and does not provide the same opportunities for writing pedagogy. In the sophomore year, when chemistry (and other science) majors take Organic Chemistry, we will continue to emphasize quality writing in the *Introduction* and *Conclusions* sections of lab reports, but will add a focus on the *Discussion* section. Lab reports in notebooks are largely written as the students work, and do not readily allow opportunities for multiple drafts. As it is important for students to benefit from editorial comments, we will give them the opportunity to write multiple drafts of one lab report per semester. In this case, the final product will be a more formal, polished paper. We will also teach students to use Chem Draw, a software program for drawing complex chemical structures, in their sophomore year.

In the junior year, chemistry students undertake our Analytical/Instrumental (A/I) sequence and Physical Chemistry. At this point we take a further step by exposing students to their first experience of writing formal scientific papers. In each semester students will be given open-ended projects in the A/I sequence and asked to write journal-style articles about them. These papers will include literature citations in the text and a reference list at the end, and they will be formatted in the style of a relevant journal such as Analytical Chemistry. Students in Physical Chemistry will prepare reports in the format of articles in the Journal of Physical Chemistry. At least two of the ten reports each semester will involve rewriting so that students will have the opportunity to improve the presentation of their results. In all the laboratory reports we will stress the *Results* section, and in particular, graphing skills required for the best presentation of data. By the end of the junior year we will have focused on all of the components of a strong lab report, and shown our students the similarities and differences in these sections when they are part of a formal scientific paper. They will also gain experience with library research and the proper use of citations. Students will be asked to read critically journal articles that will be discussed in class. Careful dissection of these articles will contribute to their understanding of this particular type of paper, and in turn, help them write in this style.

Senior Seminar, our capstone experience in the senior year, provides another opportunity for teaching writing. In this class students will write a review paper and present it in class. Review papers represent a third form of writing that is essential for chemists and round out our students' writing repertoire. Once again, we will allow the students to write multiple drafts. As in their formal scientific papers, students will be expected to follow the "Instructions for Authors" of a chemical journal. In Senior Seminar students will read a variety of materials from within the scientific literature. We will stress critical, guided reading of a variety of source materials. Many of our seniors will also carry out independent research and write a Senior Thesis. At times the writing portion of this undertaking has served as a stumbling block to our students. We hope that through the implementation of our writing plan, the thesis will be part of a logical progression in their training. Our goal is to turn out productive, well-rounded, intellectually curious majors, and we reiterate our commitment to including writing ability among our majors' many attributes.