

## **Guidelines for Project Proposal**

Scientists are frequently asked to write proposals for future work. As an example, when your physics professor wants to carry out research, he or she may need to obtain funds from their university or from a grant from an external source to carry out the work. These funds may be used to pay for equipment, materials, travel costs, salaries for research assistants, etc. After securing the funding, the professor will carry out the research. Finally, he or she will present the research at conferences, in papers, and in reports to the funding agency. But to begin this process, the professor needs to convince the funding agency that if they are awarded a grant or other source of funding, it will be money well spent. Therefore, the first step in many research projects is a formal research proposal.

Throughout this semester, your freshman project group will follow a form of this procedure. You will write a proposal, conduct research (while recording it in your journal) and report on your results in your final presentation and poster.

Therefore, your first assignment is to write a formal project proposal. The project proposal should be a relatively short document (at least two pages) written by the group, describing the planned project for the semester. It is understood that the project may change and develop as the semester goes on, however, before starting work, the group should have a clear statement of their objectives, and a plan for carrying them out. This proposal should convince the reader that this project is interesting, is well-planned, and is feasible to carry out in the semester.

### **Evaluation**

Your proposal will be evaluated on the following criteria:

- It must explain the motivation for the project.
- It must define the terms & concepts to be studied.
- It should include preliminary research to provide background and complete plan for the project. Include important equations or concepts that will be tested. References should be included and properly cited.
- It should outline the elements of theory, apparatus & experiment involved.
- It should include a list of parts needed and estimated cost.
- There should be a timeline of work for the semester.
- The proposal will also be evaluated on organization and writing quality, including clarity, spelling, and grammar.

## Guidelines for Lab Notebooks

Your lab notebook is a record of everything you do in an experiment from start to finish. It should be treated as a legal document. With the aid of your notebook, you or a future researcher should be able to reconstruct your investigation completely. You should always have your notebook with you when you are in the lab, and all entries should be dated. You should try to keep your notebook well organized and as neat as possible under the circumstances – however it is a working document and it is expected to contain mistakes, failed trials, smudges, etc. You should always write legibly in your notebook in ink, not pencil. Your notebook should be bound, the pages should be numbered, and you should never tear any pages out. If you do any work on a computer during the lab (such as generating a graph of your data) you may print it out and paste it into the lab notebook. Anything pasted into the notebook should be dated and labeled. If you make a mistake in your notebook, you should cross it out so that it is still legible. Do not erase, change previous entries, or remove anything from your notebook.

### Notebook format:

The notebook should be an 8 ½ x 11” notebook with lined paper. It should be bound along the left edge of the pages, and pages should be numbered. The first page of the notebook should be used for the Table of Contents.

**Format for each day:** For each day that you work on your project, the following format should be followed:

**Title and date:** At the beginning of an experiment, you should label the subject of the activities you are conducting at the top of the page, and enter it into the Table of Contents. You date the top of every page. Whenever you finish work for a day, cross off the bottom of the page you are working on, and start on the next page the next day. It is not allowed to leave blank space to fill in later.

**Statement of intent:** You should start the day with a brief description of what you are planning to do, and how you will carry it out. Include the questions you will attempt to answer, and key equations or theoretical points you will be checking or using.

**Description of all work done:** Depending on the day, you may be planning, doing theoretical calculations, building the apparatus, making measurements, or some combination of the above. In each case, you should briefly describe everything you do in the lab:

**Draw and describe the apparatus:** When you design the apparatus, you should include brainstorming notes and sketches. As you design and build the apparatus, you should provide a sketch of the apparatus you use in the lab and describe its function. Include any materials you will use in the lab. Record manufacturer’s name, serial # or other identifying information for any parts used.

**Data, comments, trial calculations:** Include the data as you take it. Be sure to include proper units and to write your data legibly. Comment on your data as appropriate. Make tables or otherwise organize your data when necessary to provide for easy viewing. Be sure to clearly label units on all tables. When appropriate, include trial calculations. For each calculation, write the equation symbolically, using unambiguous symbols. Then substitute in appropriate numbers with units. Finally, show your answer with appropriate units. While in the lab, do not write anything down on scratch paper. If it is worth writing down, it should be recorded in the lab notebook.

**Experimental results, conclusions, error analysis:** Work out calculated experimental results, error analysis, graphs, tables, answers to questions, and conclusions. You should also briefly discuss evaluating whether you achieved your objectives, as well as what you learned through the experiment and the significance of your findings.