

## **Bio 301M Experimental Bonus Dr. Reichler Spring 2009**

When we discussed Strong Inference in class, I mentioned that since class did not have a lab as part of the class, you would not get the chance to apply Strong Inference for yourself. But I later realized that you could practice applying Strong Inference by doing a simple, original experiment as a bonus assignment. If you choose this route, it will count as your only bonus worth up to 4 points. Up to 1 bonus point will be awarded for your proposal and up to 3 bonus points for the final report.

To get your proposal approved, you will need to be assigned a mentor. These are undergraduate students who have experience designing and carrying out experiments. Email Stuart ([sreichler@mail.utexas.edu](mailto:sreichler@mail.utexas.edu)) by February 20<sup>th</sup>, and I will assign you a mentor. It is then your responsibility to contact your mentor and set-up a meeting with them. They will be responsible for helping you develop your proposal, approve your proposal, and then help you with issues or questions that arise while you are collecting and analyzing your data.

### **Experimental Bonus Guidelines**

Proposal due in class on March 2, 2009

Written reports due in class on April 22, 2009

This experiment will be observational only. You will not use chemicals or any advanced data collecting equipment. The main data collection tool will be your eyes and/or other simple tools like a camera, watch, etc. You will work by yourself to develop, carry out, and analyze an experiment. You should be able to collect your data primarily through observation. Other than that, you are free to design an experiment to your liking.

Coming up with an original idea and then actually carrying out some experiments can be intimidating. Of course it can also be exhilarating because you have the opportunity to be as creative and imaginative as your mind will take you. Start with a question that you would like to answer. Then imagine some hypotheses and think about what data would allow you to disprove these hypotheses. If everything seems too complicated or needs very complex data collection, simplify your question, and try again. Once you get to a workable idea, finish developing your idea by writing it up. Your mentor can help you develop ideas (you need the idea, they will help you refine it), refine hypotheses or experiments, and/or check if your proposal is doable or not.

I strongly suggest searching the scientific literature to help with forming a question, developing hypotheses, and/or figuring out how to test your hypotheses.

### **Experimental Bonus Proposal Format:**

#### 1. Question

State succinctly and clearly the question you will try to answer.

#### 2. Hypotheses

Give all of the reasonable hypotheses that you can think of. This may require some research.

#### 3. Experiment

a. Describe how you will collect data. What data will you collect? Where, when, and how will you collect the data?

b. Include how your data will allow you to eliminate your hypotheses.

#### 4. References

If you used any references to develop your question, hypotheses, and/or experiment(s), be certain that you cite them. Remember, when doing research, using other's ideas is fine and necessary, but using someone else's idea without citing them is plagiarism.

\*You should print 2 copies of your proposal and bring them to your mentor for approval.\*  
(See below for the written report format.)

## **Experimental Bonus Written Report Format:**

The written report for your experiment will be formatted similarly to a scientific research article. I have included the basic information that you need in each section.

**Title-** Concisely describe your experiment.

**Abstract-** Summarize your work. Include your question and final conclusion. Do not to exceed 250 words.

**Introduction-** Give background information about your question and hypotheses.

**Results-** Describe your results including any tables or figures that you need to explain your results along with any data analysis that you performed. Include any problems that kept you from collecting the necessary data.

**Discussion-** Explain your results. If you did more than one experiment, explain how the results are or are not in agreement. What is your final conclusion? Were you able to eliminate all but one hypothesis? Were the results surprising or unexpected? Are your results different from other similar studies? What future experiments might help clarify or expand on your findings?

**Materials and Methods-** Describe how you carried out the experiments. Include the protocols you followed and any analysis you performed. Give enough detail so that someone else could replicate your results.

**References-** Cite other work that you used to develop your question, hypotheses, and/or experiment(s). This information should be specifically cited in the text of your report, and then the full citation given here. The specific format is up to you, but should include: author(s) name(s), article title, journal or book title, volume and page number, and year of publication