

Freshman Research Initiative- research methods Dr. Reichler Fall 2011 Inquiry 2: (3 weeks)

Proposal due in lab on T 9/27 or W 9/28

Written and Oral presentations due in lab on T 10/18 or W 10/19

For this inquiry you will work in groups of 3-5 students. Your group will develop, carry out, and analyze an experiment. You will need to decide what your experiment will be about, and what chemicals and/or data collecting material you will need to order. Each member of your group should have specific jobs, and the work should be divided evenly between all of the members.

Since you will be working in a group, each of you will carry less responsibility for this inquiry, but it will also mean that you will need to be more organized than you might have been for inquiry 1. You will need to divide the work and then coordinate with the other members of your group. This can be frustrating. One way to alleviate the frustration is to be certain everyone understands their responsibilities and to leave sufficient time to get everything accomplished. I strongly recommend getting all of the data collected in the first 2 weeks, and give yourselves a week for putting together the written and oral reports.

The possibility of using more advanced techniques, equipment, and reagents will add some additional complexity to this inquiry. I encourage you to be creative and imaginative in your experimental design, but at the same time to keep in mind the logistical and time limitations. I do not want your experience in this inquiry to be primarily disappointment because of equipment or reagent problems.

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.

c. What equipment and/or reagents do you need, and where will it come from? Be specific including the amounts you need and the source.

(See the class webpage for important information about ordering, order forms, etc.)

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 acceptable and necessary, but using someone else's idea without citing them is plagiarism.

5. Responsibilities

Describe the role of each member of your group. Who will collect what data? Who will write and edit each section of the written report? Who will analyze the data? Who will put the figures/tables together? Who will make the slides for the oral report? ...Etc. (These are just some suggestions for how to divide the work.)

You should print 2 copies of your proposal and bring them to lab for approval. We will keep one and you will keep the other.

(see next page for written and oral report format)

Inquiry 2 Written Report Format:

The written report for your inquiries 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.

(Additionally, include the names of the group members and the day/time of your lab on the front page.)

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

Responsibilities- Describe who did what part of the work. Part of your grade for inquiry 2 will come from the work of the group, and part will only be based only on the work that you did.

Inquiry Oral Report:

Oral reports should be about 15 to 20 minutes long. Each member of the group will give some part of the oral report. All of the parts of the written report should be included in the oral report. Do not simply read your written report. Use figures from other papers, etc, to make the introduction and/or discussion of your oral report visually stimulating. No one wants to be bored looking at text for 20 minutes. Show us how you collected your data. Tell us about any problems that you encountered. What conclusions did you reach, etc?

(You should use presentation software like Powerpoint, Keynote, or Open Office to make your oral report slides.) Always save a version of your presentation as a pdf to avoid incompatibility issues.