

Summer Packet for  
**Directed Science Research**

By the first day of the fall semester, you must have

- Chosen a topic and narrowed it down to a manageable project
- Written a 3-4 page research paper, with an additional References Cited page
- Written a project proposal, with all four necessary components

Failure to complete all tasks may prevent you from being permitted to take this course in the fall. At the very least, it will set you back and prevent you from maximizing project time. If you have any questions, please contact Mr. Temperley during office hours. He should direct you either to one of the new science faculty or to Miss Maas.

### **Choosing a Topic**

The first step in this project is to choose a topic. Before you left school for the summer, you should have declared the subcategory of science that you wanted to study. If you did not do so, please notify the school, as they will be working to locate science professionals in the community who are willing to mentor you. If you already have a science professional that you would want to work with, please let the HCS office know as soon as possible.

- Animal Sciences
- Behavioral and Social Sciences
- Biochemistry
- Cellular and Molecular Biology
- Chemistry
- Computer Science
- Earth Science
- Energy and Transportation
- Engineering
- Environmental
- Mathematical Sciences
- Medicine and Health
- Microbiology
- Physics and Astronomy
- Plant Sciences

After declaring your subcategory, you will need to choose a topic. This is something you will be working on all semester, so find something that interests you. Right now, this topic can be quite broad, but you will be researching this topic and narrowing it down, until you have settled upon a manageable project.

### **Research**

Science is an always-changing, always-improving field. Before beginning any experiments, it is important to gather the latest information on your topic. Not only will you learn concepts, techniques, and terminology, but you may also discover that your topic has already been “over-tested” in the past. Unless you can design an experiment that is different, you should try to pick a topic that is unique.

Over the summer, you must locate *at least* five articles or books about your topic. You will then be required to write a 3-4 page paper (minus the References Cited page), summarizing your findings. This paper should be double spaced, with 1 inch margins and size 12 fonts.

Throughout this paper, you must clearly acknowledge all of your sources. This includes not only direct quotations, but also all sources in which you paraphrase or summarize, and all figures or illustrations.

### Citing References in Text

When you cite a reference in your paper, use one of the following three formats:

1. State the facts or ideas in the text and then put both the author's name and date in parentheses.  
Ex- More than 450 species lived and bred in Iowa when the Europeans arrived and another 190 bird species migrated through Iowa (Dinsmore, 2004).
2. Quote the author exactly, using quotation marks. At the end of the quotation, list the author's name, the date, and the page number in parentheses. (If it is in internet source, you may not be able to include a page number)  
Ex.- "There have been many developments over the past three decades that have led to the efficient manipulation and analysis of nucleic acids and proteins" (Walker, 2008, pg. 3)
3. In the text, mention the organization or author by the last name. Then give the year in parentheses.  
Ex- According to the University of Medicine and Dentistry (2007), good hygiene...

### References Cited

Your list of References Cited is a record of all (and only) the references you used in your paper. You can use it while working on your paper to keep track of the sources that you have used. Once you have completed your project, others can use it to find additional information about your project. Your References Cited should be arranged in alphabetical order by the last name of the first author. It should also be reverse-indented, to help the reader find authors faster. The exact format is not critical, but be sure your citations are complete and consistent.

## **Proposal**

In addition to submitting your background research, at the beginning of the fall semester, you will also be required to submit a project proposal to the HCS science faculty and your mentor. This proposal defines the focus of the research and should include:

1. Rationale
2. Project Outline
3. Planned Data Analysis
4. Budget

There is no minimum or maximum length for your proposal, as long as it covers the above material. Like your research, the proposal should be double spaced, with 1 inch margins and size 12 fonts.

### Rationale

In this section, you should introduce your project. What prompted your research and what do you hope to achieve in your experiments? Clearly state the precise question(s) you are addressing. Then explain the importance or implications of your study. What new information do you hope to learn?? While you do not have to restate all of your research, it is helpful to include some of the critical background information on previous work that has been done in your area.

### Project Outline

In future meetings with your mentor, you may decide to change part(s) of your experiment. For now, describe, in a fair amount of detail, one possible controlled experiment that you could do. This does not need to be a step-by-step procedure, but it should be an enough detail for your mentor to understand how the experiment will be done. After stating your hypothesis, be sure to also list your independent and dependent variables, control, and constants.

### Planned Data Analysis

In addition to including your expected results, describe the type of data you will collect and how you plan to analyze it. Later on, your mentor will assist with correct interpretation of data.

### Budget

Depending on your project, your mentor may be able to give you access to appropriate lab equipment (and provide instruction on techniques). However, you will be responsible for purchasing all disposable and perishable items for your project. To get an idea of materials that will need to be bought or borrowed, include a list of materials and their estimated costs.