



## Research Project Guidelines

### Project objectives:

1. Research scientific work that relates to some topic in behavioral ecology:
  - Using library and internet research, obtain at least TEN related sources of information on a particular behavior or set of behaviors. Discuss the methods and findings of these studies.
  - Use figures, graphs, or tables from your sources in your *Appendix* (see below). Make sure to properly cite the source of all components of the *Appendix*.
  - Based on this research, identify some important questions in behavioral ecology.
  - Choose a question that you can attempt to answer through your own observational study.
2. Design a study which tests one or more hypotheses about behavioral ecology:
  - Consider all possible hypotheses that could potentially provide an answer to your question.
  - Use these hypotheses to generate testable predictions.
  - Design an experiment (manipulative or observational) which tests these predictions.
  - Perform your experiment and gather data.
3. Analyze your data and reach a conclusion based on your study:
  - Display your data using useful tables, figures, and graphs (place these in your *Appendix*).
  - Discuss the meaning of your data, and contrast your findings with the predictions of your various hypotheses.
  - Relate your findings to the findings of the previous studies you researched.
  - Reach a conclusion about what your findings mean, discussing their broader importance.

*Some examples of the kinds of projects which could fulfill these objectives:*

- ★ **Observational studies of animals:** We are lucky to have several high-quality zoos and aquaria in the New York City area, and many of these house animals whose behavior can be directly observed by the public. We also live in an “urban ecosystem” containing particular animals whose behaviors can be observed.
- ★ **Observational studies of humans:** We also are lucky to live in one of the most densely-populated cities in the world, and there are many opportunities to observe behavior in public spaces.
- ★ **Manipulative experiments with humans:** There are plenty of students on campus. Using an activity, interactive work, or some other humane experiment, you can gather direct data about behavioral ecology.

*This list represents a beginning; it in no way represents the full extent of possible successful projects.*

## Major Milemarkers of the Project:

### *Research Proposals:*

You are required to submit a short project proposal by Monday, **October 10th @ 11:59 pm**. All proposals will be through the *LMS* system. Your instructor will post comments on *LMS* letting you know whether the project proposal is approved; if the proposal is not approved, you should contact your instructor during office hours, by phone, or via email to settle on a workable project idea.

### *Research Plans:*

You are required to submit your draft research plan via *LMS* by Monday, **October 24th @ 11:59 pm**. On Monday, **October 31st** you will present this draft plan to your classmates, who will give you feedback on your experimental design. Your instructor will upload comments on *LMS* in response to this draft; based on these comments and the suggestions of your classmates, you will revise and re-submit your research plan via *LMS* by Thursday, **November 3rd @ 11:59 pm**.

The *Research Plan* should be composed of five sections:

- The **Background** section is where you should summarize the findings of your sources. What has been discovered about the behavior you are interested in? What methods have been used to make these findings? What questions about behavior still need to be answered?
- The **Question** section will contain a single sentence that states the question your study will answer. For example, I might ask "When during the day are squirrels most bold?"
- The **Hypothesis & Predictions** section will be composed of all possible hypotheses that might answer your chosen question. For each of these hypotheses, write predictions in the "If... then..." format. For example, for the question above I might hypothesize that squirrels are most bold during the early morning and early evening when light conditions make them less obvious to predators. My stated prediction for this hypothesis would be "IF squirrels are more bold when there is less sunlight, THEN I should observe longer trips away from a tree during the early morning and early evening".
- The **Materials & Methods** section will contain detailed instructions on how you will perform the experiment that tests the predictions you made in the **Hypothesis & Predictions** section. The standard of quality for this section is simple: anyone with basic scientific knowledge should be able to perform the experiment using the instructions found in the **Materials & Methods** section. If you want, you can write this section in the past tense (as if you already performed it); this will make life easier when you write your final research report.
- The **Sources** section should list all sources discussed in your **Background** using a standard, consistent bibliographic format.

### *Research Data:*

You will collect data based on your research plan during November. You are required to submit your raw research data via *LMS* by **Friday, November 25th @ 11:59 pm**. On Monday, **November 28th** we will work in class to analyze this raw data and turn it into useful figures, tables, and graphs. You are required to submit your analyzed research data via *LMS* by **Friday, December 2nd @ 11:59 pm**.

Elements of the analyzed research data:

- Your analysis should have two fundamental sections: the **Results** and the **Appendix**.
- The **Results** section will be a simple, clear description of your experimental findings. These findings should be related to the **Materials & Methods** section in that they explain what happened when you completed your research plan. Rather than including lists of raw data, the **Results** section should refer to the figures, graphs, and tables found in the **Appendix** section.
- The **Appendix** section should contain all of the figures, graphs, and tables you created to display your data.

## Format of the Paper:

1. Please present your work in type-written, double-spaced format. Font should be 12 point, margins should be 1" on all sides.
2. Produce at least six (6) and no more than ten (10) pages of double-spaced text.
3. Provide an *Appendix* (does not count towards page minimum or maximum) that presents figures, charts, images, or other helpful auxiliary information to support your paper. All of your data should be summarized in this *Appendix*. You may also want to provide detailed methods in this section. Label each part of your appendix with a letter (for example, the first item will be "Appendix A"). Make sure that you refer to all parts of the *Appendix* in the main text of your paper.
4. Reference all ideas that are not your own using a numbered bibliography (does not count towards page minimum or maximum). Both superscripts<sup>1</sup> and bracketed [2] citations are acceptable, but use a consistent format.

## Citations:

1. All citations must be referenced in the text. In referencing your citations, use the last name of the author(s) and the year. *For example:* "Prairie dog behavior seems to be consistent with the resource dispersion hypothesis (Jensen and Moore 2008)."
2. Please use a standard bibliographical format and use it consistently.
3. Please be careful about web citations. Much of what is published on the web is unreliable. It is up to you to assess the validity of all your sources.
4. Internet references should be cited with a page title, a full URL address, and the date accessed. *For example:* Ecology for Architects Main Page, <http://sci177a.pratt.edu/index.html> Accessed 5-Feb-2007.

## Submission of the project:

This project is due on **Friday, December 9th @ 11:59 pm EST**. All papers should be directly uploaded to the *Learning Management System* in *Adobe PDF* format. There is a 10% penalty per day of lateness.

Your *Final Research Project* should have seven (7) fundamental sections: a **Title**, an **Introduction**, the **Materials & Methods**, the **Results**, a **Discussion**, the **Literature Cited**, and an **Appendix**:

- For the **Title** you may use either a descriptive phrase or the **Question** that you submitted as part of your Research Plan. If your **Question** is not used, make sure that the **Introduction** clearly explains what question you are answering in your study.
- The **Introduction** should include an overview of other research that has been done to answer questions related to your own. To meet the minimum requirements, you must cite at least ten (10) sources that describe previous research completed in this area. In addition to describing what was known prior to your study, the **Introduction** should explain the significance of your question. The **Introduction** should also provide critical background information that allows the reader to understand the question you are asking. Finally, the **Introduction** should explain the hypotheses you plan to test, along with the predictions you will use to test these hypotheses.
- The **Materials & Methods** section should describe what you did. If you did a good job on your research plan, you should be able to cut-and-paste this directly from previously submitted work.
- The **Results** section should describe your data using reference to figures, graphs, and tables listed in your **Appendix**. If you did a good job in analyzing your data, you should be able to cut-and-paste this directly from previously submitted work.

- The **Discussion** section should interpret the **Results**, pointing out the significance and broader importance of what you discovered. The **Discussion** should also provide a conclusion that summarizes your findings and suggests areas for future research.
- The **Literature Cited** should list all sources used to compose your paper.
- The **Appendix** should contain all of your graphs, figures, and tables, each labeled *and* titled so that they can be easily and unambiguously referred to in the main text.

### **How you will be graded:**

Your grade will be primarily based on how well you meet the objectives stated above. In addition, your instructor will assess how well you expressed an understanding of behavioral ecology concepts. All written work is expected to use proper spelling and grammar, except where obvious and necessary creative liberties are being taken with the language. Please see the *LMS* for sample grading sheets that provide you with a precise idea of how you will be graded.

### **On academic honesty:**

Plagiarism of any kind will not be tolerated. All cases of suspected plagiarism will be turned over to the Registrar's office for potential referral to the academic judiciary. Please be careful to indicate the source of all ideas other than your own; this includes both direct quotes ("evolution is the science of...") and paraphrasing of books, scientific papers, and websites. Careful citation makes you seem more authoritative in whatever you write.