



## Research Project Guidelines

### Objectives of the project:

1. Explore the features of one of the following computerized evolution simulators:
  - PBS' Sex and the Single Guppy** (<http://www.pbs.org/wgbh/evolution/educators/lessons/lesson4/act2.html>): Using this flash-based interface, this module explores the tradeoff between mate attraction and predator avoidance.
  - Avida-Ed** (<http://avida-ed.msu.edu/>): This program allows you to follow the evolution of digital organisms.
  - SuperDuperWalker** (<http://hampshire.edu/lspector/superduperwalker.html>): This simulation program allows you to perform experiments on the evolution of locomotion through an interface that simulates the effect of slight variations on the efficiency, efficacy, and speed of locomotion.
2. Formulate a *Research Question* that can be answered using your chosen evolution simulator.
3. Research your topic and identify other studies that have addressed similar questions.
4. Formulate a hypothesis that predicts an answer to your *Research Question*.
5. Design an experiment on your chosen evolution simulator that tests this hypothesis.
6. Perform your experiment and gather data.
7. Organize your results in the form of tables, graphs, and other visual representations of data.
8. Analyze your data and discuss its significance in the context of your *Research Question*.

### Sections of your lab report: *all lab reports should contain these sections...*

1. **Title:** Your *Research Question* is your title. This *Research Question* should be detailed enough to give your audience a clear idea of what you are investigating, but concise enough to be a single sentence.
2. **Introduction:** Your introduction is where you should discuss other studies that relate to your *Research Question*. You must cite **AT LEAST THREE SCIENTIFIC SOURCES** in your Introduction. You should also discuss the purpose behind doing your study, and clearly state the hypothesis you intend to test.
3. **Methods:** The methods section provides a succinct summary of what you did (your experiment). Using the methods you describe, anyone with basic scientific skills should be able to replicate your study.
4. **Results:** In the results section, you discuss the data produced by your study in a factual manner. Using references to figures, graphs, and tables in your *Appendix*, you point out any important trends in the data generated by your experiment.
5. **Discussion:** The discussion describes the meaning of your findings. It suggests reasonable interpretations of your data, and draws conclusions from your work. It also should suggest directions for future work that is inspired by the work already completed.
6. **Bibliography:** List all of the sources that you cited in a Bibliography. Do not include sources that have not been cited in the main sections of your paper.
7. **Appendix:** All of your data should be provided as figures, graphs, or tables in an labeled as "Appendix A", "Appendix B", etc. Do not include material that is not cited in the main sections of your paper.

## **Format and scope of the paper:**

1. Please present your work in type-written, double-spaced format.
2. Produce at least three (3) and no more than six (6) pages of double-spaced text.
3. Provide an *Appendix* (does not count towards page minimum or maximum) that includes data tables, graphs, figures, and images that support the written portion of your lab report.
4. Reference all ideas that are not your own using a numbered bibliography. Both superscripts<sup>1</sup> and bracketed [2] citations are acceptable, but use a consistent format.

## **Citations:**

1. Please use a standard bibliographical format and use it consistently.
2. 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.
3. 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.

## **Proposals:**

You are required to submit a short project proposal by Tuesday, **February 23rd**. 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.

## **Submission of the project:**

This project is due on Wednesday, **March 24th**. All work should be directly uploaded to the *Learning Management System* in *Adobe PDF* format. There is a 10% penalty per day of lateness.

## **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 evolution. 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.