

Project 2: Designing Original Research

3. Research Proposal Guidelines

You will each write an independent proposal. I recommend that you begin outlining and then writing sections as soon as you can (see **Writing Timeline**). Keep in mind the three minimum criteria for funding: your proposed research should be **definitive, feasible, and significant**.

PROPOSAL FORMAT

Proposals sent to funding agencies are usually written in a standard format, for a good reason: putting information where it is expected makes the proposal easier for reviewers to read. Keep in mind that a reviewer (just like a course instructor) sits down with a stack of proposals, and yours may be #30 in the stack. A proposal that puts information in the right places, that develops ideas logically, and that is written clearly will capture the attention of the reader. Weak development of ideas, inadequate background, poor experimental design, and failure to explain the significance of the research can all sink chances for funding.

Use these guidelines to write a strong proposal. Your proposal will have five text sections:

I. Introduction – This section provides the context for your work. It summarizes the general biological issues, gives background information from previous research, and provides the logical justification for your specific research. It should be organized from general to specific: begin by describing the general problem; introduce your focal species and review what is known about it with regard to the problem; and discuss how previous studies set the stage for the research question your proposal will address. By the end of the introduction, the background information should have led to a question and the motivation for answering it should be clear.

II. Objective and prediction – Objectives are stated as specific questions or hypotheses that address an important gap in our knowledge. They motivate the research, leading to specific predictions that are testable with data. Including a brief rationale for each objective helps the reviewer to understand how the question relates to the background material. Explain why you think your prediction is likely to be correct, and why it provides a thorough test of your hypothesis. A critical prediction is a set of results that will occur only if your hypothesis is correct. That is, your experiment should provide a **definitive** test of the critical prediction.

III. Proposed research – Describe your experimental design and methods in detail. Include detail at a level sufficient for someone else to repeat your experiment and obtain comparable data. Explain the logic for why you included each of the treatments in your experiment and for the measurements you will take. Think about how to convince the reviewer that your experiment is a good way to test the critical prediction. Anticipate in the minds of reviewers any concerns about three critical aspects of experimental design: replication, control, and bias. Define your subjects. Use diagrams that can help to understand your experiment.

IV. Possible results – Describe and graph the results expected *if* your prediction were supported by the data you propose to collect. Describe and graph one or more alternative results that would *not* support your prediction. Although many alternatives could be possible, choose only those that are biologically interesting. The goal is to show the reviewer that you can already interpret different possible outcomes of your experiment. (These are prediction graphs that show relative relationships, not actual data.)

V. Significance – Describe the importance of the research in narrow terms and then broad terms. Although most experiments can only address a small part of a big problem, you should explain

how an answer to your question could eventually help to solve a larger problem for your focal species, as well as how it will contribute to our general understanding of the broader biological area. The significance section completes the hourglass, moving from specific back to general.

Your proposal should also include:

- *Title, name & affiliation of investigator, and name of working group* – top of the first page.
- *Figures or tables* – best placed on the same page where they are referenced. Each should have a number and caption, and should be referred to by number in the text.
- *Literature cited section* – immediately following the text.

OTHER CRITICAL ISSUES

1) **Clarity! Precision! Economy!** Writing—which involves turning inter-related thoughts into a linear string of words—is one of the hardest things we do. Good writing (which takes hard work and patient editing!) is easy to read because it states ideas clearly, precisely, and in relatively few words. Remember that your proposal will be evaluated for both **content** and **writing quality**.

2) **Literature review.** Good scholarship requires that you understand and convey how your research relates to previous work. To make a convincing case, you must include sufficient reference to primary literature in your proposal to show that (a) you understand the general problem for your focal species, (b) you know what has already been done to address this problem, (c) you have identified an important unanswered question, and (d) you know enough about the species or related organisms to design a realistic and feasible experiment.

3) **Proper citation.** Every source cited in your proposal must be in your literature cited section, and every source in your literature cited section must be in your proposal. See the course website for recommended formats for both the citations and literature cited section.

4) **Avoiding plagiarism.** Bottom line: **You must write in your own words using your own sentence construction based on your own understanding.** Plagiarism is a serious violation of the honor code for which there are mandatory and severe penalties—better to turn in bad work than to receive an XF. You must understand what constitutes plagiarism at the course website.

5) **Help with writing.** (a) Read the article by Gopen & Swann (1990) at the “Other Resources” link at the course website. (b) The Writing Lab, part of the Center for Student Learning in Addlestone Library, is a free resource staffed by consultants who can help you to improve your writing (<http://csl.cofc.edu/labs/writing-lab/>). Use this resource wisely!

WRITING AND PRESENTATION TIMELINE

The BPA Call for Proposals describes assignments that are due each week. Use the following additional information to keep on task in writing the parts of your proposal.

Week 2: As you read the primary literature, begin to outline your **introduction**

Week 3: As you identify the research priority for your project, begin to outline the **significance** section and the **objectives** section. Begin to write your **introduction**. Your pre-proposal will be due before next recitation.

Week 4: As you define your own research question, outline and write your **methods** and **possible results**. Refine the outline for your **significance** section and write your **objectives** section.

Week 5: Finish writing all sections. A complete draft is due at the next recitation.

Week 7: Based on feedback received in week 6, revise and complete your proposal, due at the final recitation. Prepare your working group presentation for the funding panel.