Parts of a Proposal: standard for physical science research proposals

- **Cover Page**
- **Abstract/Summary**
  - First section to write (good to outline) and last sections you revise.
  - Be brief, clear and try to catch the reader’s attention.
  - Mention the problems that you are addressing, with some minimal background to orient the non-specialist.
  - Identify yourself and your credibility.
  - The overall hypotheses you are testing and the corollaries of these hypotheses that are being addressed by specific experiments.
  - Make certain that your plan never assumes that your hypotheses are true.
  - Your overall plan. List of objectives. Include only research/plans that you have the expertise to do and for which you have some preliminary data demonstrating feasibility.
  - How will your work advance your field of research?
  - Describe the research methods.
  - If human subjects are involved, do you have access to them?
  - Be realistic. Can the project be completed in the time indicated and with the resources requested?
  - Include the total cost (funds requested and funds already obtained).
  - For NSF grants – need to mention the Broad Impacts of your work – see NSF document on Broad Impacts for examples of what these impacts are.
- **Background (Literature Review)**
  - This section should convince the reader that you have a good command of the current research literature in your field, and that you can be objective and thoughtful in your analysis of the data. Know who is actively working and publishing on the topic. Cite up-to-date sources. Use previous and current research to support your project.
  - Cite the work of as many different points of view as possible, consistent with clarity and space limitations.
  - Don’t dodge controversies, but make certain that you are diplomatic in your treatment of opposing points of view.
  - Make certain that your background discussion remains focused on the issues your experiments will address.
- **Proposed Research**
  - Identify relevant published papers which you have written or co-authored.
  - Your research should addresses important questions/problems in the field and answer many of those questions in a convincing way.
  - If the aims of the project are achieved, how will scientific knowledge be advanced or otherwise contribute to the field?
  - Make the case that the proposed research is original/innovative, especially for NSF. For example, does the project challenge existing paradigms, address an innovative
hypothesis? Does the project employ novel concepts, approaches or methodologies? Search academic journals and databases to know what has already been done.

○ Convince the reviewers that you are planning to test hypotheses, not simply to collect data to confirm your favorite hypotheses and that you are open-minded enough to reject your hypotheses if the experimental results so indicate. What are the expected results of the research?

○ Can you can deliver what you promise to do (is the project doable)? You need to accomplish your plan in the time requested. Show that you have access to all that is needed to execute your plan.

○ How will the project benefit society?

○ How will you disseminate your results? Mention expected publications.

○ Preliminary Results – what have you already done on this project?
  ▪ Show the reviewers that you have experience (hopefully published) with most of the research techniques proposed in the application.
  ▪ Show the reviewers that you can design logical, well-controlled research and that you will present your results in a clear and thoughtful manner.
  ▪ Show data demonstrating your ability to conduct the most difficult of the proposed research. Present your preliminary results in a professional manner as possible, with clear and complete figure/table legends, calibrations, statistical analyses, etc. Present the data as objectively as possible. Don’t overstate your claims or ignore different possible interpretations.
  ▪ Explicitly point out the relevance of your preliminary data.

• Research Design and Methods
  ○ Are the methods, conceptual framework, and analyses adequately developed, well reasoned, and appropriate to the aims of the project? Be aware of the limitations of each technique, e.g., don’t use a qualitative design to address a quantitative question. Does the applicant acknowledge potential problem areas and consider alternative tactics?
  ○ Provide details of the study design, sampling procedures, and data analysis. Mention why you selected a particular research method: provide a rationale and discuss rejected alternatives
  ○ Indicate how you will design and execute research addressing each of your specific aims.
  ○ Propose only research that are directly relevant to testing your hypotheses and that you have the expertise to execute successfully.
  ○ Don’t propose more than you can reasonably do within the allotted time.
  ○ Try to close the methods section with some overall enthusiastic statement about the importance of your research.

• Budget – must be realistic
  ○ Always justifiable (necessary for the project’s success)
  ○ Allowable – permitted or not specifically prohibited
  ○ Reasonable – costs incurred by a prudent person
  ○ Make certain your application is internally consistent. Your budget must agree with the experiments you propose.
- Don’t pad it. Ask for the amount of money you need to do the work. If you pad the budget, the reviewers are likely to cut it by more than the amount you padded.
- If grants have a range of funding – don’t go over or under the range
- Budget narrative – say why you arrived at every cost item. It must be clear and in sequence with the budget items. JUSTIFY EVERYTHING.