

STAT 511 Project Description

Spring 2018

GOALS:

Write a project description (similar to a proposal) for your study with an emphasis on the design and proposed analysis (as opposed to background information and literature review). The first focus of the project is to thoroughly describe the study design and discuss the implications of the design on inference that can be made from the study. The second focus is evaluation of assumptions (as much as possible) regarding a proposed statistical analysis.

The project does not have to include any actual data analysis. If you have enough data to provide me with an example of what you are planning to do you can include it if you wish.

The project will be done according to the following schedule:

1. Meet with me by Friday March 9 to discuss your ideas.
2. A first draft is due by Monday, April 2.
3. I will have reviews back to you by Friday, April 13.
4. The final project write-up is due Friday, April 27.

AUDIENCE: Suppose your audience is other scientists, but not necessarily those in your field of study. Assume they have only introductory knowledge of statistics.

FORMAT: The project should be written in complete sentences and paragraphs. Please label your sections according to the four sections outlined below. Write a maximum of five, double spaced pages (not including figures, plots and code which should be placed in an Appendix). Please double space for ease of editing. Double-sided printing is encouraged if possible.

READING: Read Chapter 23 in *The Sleuth*, “Elements of Research Designs”, specifically focusing on Section 23.6.

I. INTRODUCTION

- Set the stage: Give a relatively brief overview of the general research area and problem (approximately one page). The goal is to motivate your problem and give the reader the necessary information to follow the rest of your proposal, but not to provide the entire background and literature review.
- In one short paragraph, clearly state and describe your question(s) of interest. These questions should be specific enough that you will actually be able to answer (or address) them with your statistical analysis. They should, however, still be stated within the context of your research problem. (NOTE: This may sound easy, but can often be the most difficult step when the objectives of your research are broad. Spend time narrowing them down and thinking about if they are truly answerable and what each answer

would mean. For this project you will probably need to narrow down the focus to only one or two main questions of interest. In other words, you can simplify your research goal as much as needed to narrow it down to an answerable question for the purposes of the project.)

II. STUDY DESIGN

Thoroughly and completely describe the study design. Discuss decisions and tradeoffs you had (or will have to make) and problems you did (or expect to) run into during data collection. You should include things such as:

- Draw a picture or figure (can be by hand on a separate piece of paper) illustrating the study design. This can save many words and make things much clearer for the reader.
- What is the response of interest (*i.e.* what will you be measuring/recording to help answer your question of interest)?
- What are the “independent” experimental (or study) units?
- Randomization to groups? *Explain* whether you are designing a randomized experiment or an observational study. If it is a randomized experiment, explain how the random assignment will be accomplished. If it is an observational study, describe how and why you chose the groups you did.
- Random sample from some larger population? Discuss how you plan to choose (sample) the units to be included in your study. What are your populations of interest? If you are not able to take a random sample, or choose not to, explain why.
- Can you think of any potential confounding factors that might threaten your ability to make the conclusions you would like to make? If so, what will you do to try to control for these?
- What will your data set actually look like when you are ready to analyze the data? Include an informal sketch of your spreadsheet (rows and columns labeled) in the Appendix.

III. STATISTICAL PROCEDURES USED

- Exploratory Data Analysis: What plots and summary statistics will you want to look at to get to know your data? Make sure you keep in mind what your independent experimental (study) units actually are.
- Statistical Analysis: What statistical analysis do you plan to use and why? The choices (based on what we have covered in class) seem limited right now. Feel free to propose ideas beyond the scope of this class - *i.e.* from relevant literature or other classes.
- Evaluation of Assumptions: Discuss how well you think the assumptions are (or will be) met for the analysis you plan to use. Be specific. Even if you are unsure how to do the proposed analysis, you should be able to find information regarding the assumptions of the proposed method.

IV. SCOPE OF INFERENCE: Write a *Scope of Inference* based on your study design, as done in the homework assignments.

GRADING:

- Total points (65 pts):
 1. WRITING (15 pts)
 - (a) Following the specified format and directions
 - (b) Writing in well organized, complete sentences and paragraphs
 - (c) Spelling and grammar
 2. DESCRIPTION OF STUDY DESIGN (25 pts)
 - Is the study design clear from the description? Are the implications of the design on what inference can be made clearly and thoroughly discussed?
 3. ASSESSMENT OF ASSUMPTIONS OF PROPOSED STATISTICAL PROCEDURES (25 pts)
 - Are assumptions of the proposed analysis clearly stated and discussed within the context of the research question? Are strategies for checking the assumptions proposed? Does it appear that the proposed statistical methods are appropriate?