

Statistics 305 Out-of-Class Project Description

20% of your course grade in Statistics 305 will depend upon successful, on-time completion of the following exercise. These projects are to be done in teams of 3, with any deviation from this number requiring explicit prior approval of your instructor. They are to result in thorough but concise, professional quality technical reports of not more than 10 double spaced pages. They are to be turned in to your instructor in class on *****. Your instructor will keep these written reports, so if you want copies for your records, make them before turning in the project.

You are to pick a subject that interests you (preferably one with some engineering flavor) and plan, execute and analyze the results of a several-factor experiment intended to increase your understanding of the subject. Choose your subject so that the factors involved are fundamentally quantitative and your response variable y is a continuous measurement, so that the curve and surface fitting methods of analysis in Sections 4-1, 4-2, 9-1 and 9-2 can be sensibly used in data analysis. Include a minimum of 2 different x variables (factors) and collect responses for at least 9 different combinations of " x " values. When planning this study, pay attention to Chapter 2 in the text, particularly Section 2-5. After experimenting make a thorough but concise report of your entire investigation. Include at least

- 1) an executive summary (a one page overview of your problem and results written for a busy engineering manager)
 - 3) a description of the reason for your study,
 - 4) a statement of how you a priori expected the study to turn out,
 - 5) what you did and how you did it (in enough detail that your instructor could replicate it if he or she wished, without having to ask you for more details of exactly what equipment and materials were involved, how they were used, etc.),
 - 6) a list of the raw data you obtained and circumstances surrounding their collection (order of collection, etc.),
 - 7) appropriate statistical analyses of the data (use graphics as well as numerical summaries!)
 - 8) a statement of the subject matter implications of your study,
- and 9) a discussion of further questions raised by your study that might be investigated in a subsequent experiment.

You should include sketches of physical apparatuses used. Simply attaching a ream of computer printout is not what is meant by including an appropriate statistical analysis! The main body of the report should include only the end products of any statistical calculations (but example calculations should be included in an appendix so your reader can see how your end products were produced). If you are going to include complete computer printouts, they should be painstakingly annotated and included only as appendices (small parts of printouts may be integrated in the text where appropriate). Any appendices should be referred to explicitly in the text (don't leave the reader guessing why appendix material is included). Write the report for absolute clarity! Statistical jargon for the sake of statistical jargon will not be well received.

This project should probably not be based on a laboratory exercise completed for another class, unless you can convince your instructor that you were responsible for the planning and execution of that exercise. The text is full of examples of the kind of studies that are possible. This project need not be expensive nor require a huge time investment in data collection. But it does need to show careful planning, good logic and the use of data collection and analysis concepts discussed in the course. Some part of your instructor's reaction to your project will also inevitably reflect the originality of your topic, so choose it with some care.

Please note that the requirements here involve genuine experimentation. A completely observational study or an analysis of data collected by someone else will not be acceptable. For example, do not plan to use (even a carefully done) opinion poll (a type of observational study) or make an analysis of this year's NFL yardage, passing, scoring, etc. You will probably have less

trouble with the project if the response or responses that you consider are derived from some physical measurement as opposed to say a 1 to 10 "rating" by an "expert".

You may not use human "subjects" in your study. (Your instructor does not wish to deal with the red tape involved with getting approval to do so from the University Committee on Human Subjects in Research.) And you may not choose a topic that is illegal or potentially dangerous to you or anyone else. Before conducting your study, you will need to submit a one-paragraph description of what you plan to do and obtain your instructor's approval (in the form of his or her signature on the statement). This (signed) statement should be turned in with your project report.

Attached to the group written report, each team member will also include a separate sealed envelope giving his or her assessment of the percentage of total team effort provided by each group member (these numbers should total to 100%). In the event that it becomes evident that the project workload was wildly unbalanced within a team, your instructor may assign differing individual project grades within a team.

Team average scores for these projects will be assigned according to the following schedule:

Executive Summary and Table of Contents 5%
Reason for Study and *A Priori* Beliefs 5%
Description of Data Collection 15%
Appropriateness of the Data Collection Plan 10%
Presentation (and Annotation if Needed) of Raw Data 10%
Statistical Analysis 15%
Subject Matter Implications and Questions for Further Study 10%

Professional Appearance of Report 10%
General Readability of Report 10%
Appropriateness of Project Topic 10%

Pay attention to this set of guidelines! Your work will be judged against it!