

## STAT 402 Project for Spring 2009

The purpose of this project is to give you the experience of designing, conducting and analyzing data from an experiment. You may do this as a group project or an individual project. The topic for your project is basically up to you. There are some possible topics listed on the next page but you are free to choose your own topic. You must have your topic choice approved by Dr. Bob. Experiments involving human subjects are subject to IRB rules and may not be appropriate for this assignment. The experiment itself must have:

- At least two factors of interest. In addition to the effects of these factors you must also investigate interaction between the two factors.
- You must have at least 8 treatment combinations in your experiment.
- Randomization. You may run the experiment as a completely randomized design, randomized complete block design, Latin square design or split plot design. The design you choose should take into account the material you are using and any nuisance factors.
- Replication. You should plan to have enough replication so that differences in **factor level** means between 1 and 2 standard deviations can be detected.
- Control. You should control outside variables as appropriate.

Your final report should include the following:

- **Executive Summary:** One paragraph briefly describing the experiment and the results. Although this appears first in the report it is usually written last.
- **Description of the Experiment:** Indicate response, factors of interest, treatment combinations, any nuisance factors and experimental material. Describe in detail how the experiment was conducted. Be sure to specifically indicate how randomization was included in the design. Be sure to record the order of the runs.
- **Analysis of data:** Do **NOT** include raw computer output. You can cut and paste the appropriate graphs and output into the body of your report.
- **Summary and Conclusions**
- **Appendix:** List all the data collected including the responses, factor levels, treatment combinations and run order. A copy of the JMP data table is fine.

**ONE** report is to be submitted by each group. The reports will **NOT** be returned. It is the group's responsibility to make copies for its members. Write the report so that someone with little or no knowledge of statistical jargon can understand it. An important part of statistics and experimentation is being able to communicate results effectively. Each team member should submit a sealed envelope with the names of all group members and an assessment of the % contribution to the project. If no envelopes are turned in, I will assume everyone contributed equally.

Your project will be graded based on the following criteria:

- Design and running of the experiment (30)
- Appropriateness and correctness of analysis (30)
- Appropriateness of conclusions (5)
- Following guidelines (10)

Each student will receive a critique of the project. Each student will also receive a score based on the grading criteria and his/her participation in the project.

## Time table

You may submit work anytime **on or before** the listed dates. Submissions after the dates listed below will result in deductions from your project score.

- **Apr. 1:** Groups formed and topic chosen. Each group should submit a list of the names of group members and the topic chosen. Indicate the response variable, conditions, and experimental material. Comments on project proposals will be returned the next class period. Do not start on your project until you get approval from Dr. Bob.
- **Apr. 8:** Groups submit details of the experiment. What factors will be manipulated? What levels are there for each factor? What design will be used? How much replication will you have? How will you use randomization? A data collection template should be turned in at this time indicating the randomized order of your runs. This can be a hard copy of a JMP or SPSS data table. Comments on project details will be returned the next class period.
- **Apr. 22:** Data collection completed. A copy of the data must be submitted and no changes to the data can be made after submission. You should email ([wrstephe@iastate.edu](mailto:wrstephe@iastate.edu)) the data in the form of a JMP data file.
- **Apr. 30:** Final report due. Each group should submit only one report that includes all group members' names. Reports will **NOT** be returned. Each individual will receive a critique of the project and a project score.

## Project Ideas

Listed below are some possible topics for investigation. You are also free to choose your own topic. All topics require you to actually design and conduct an experiment. Whether you come up with your own topic to investigate or use one of the topics below, you **must** check with Dr. Bob before you proceed. Experiments involving human subjects are subject to certain restrictions. Getting approval can take a long time and so an experiment involving human subjects may not be appropriate for this assignment.

- Quality of paper towels, toilet paper, tissues, etc.
- Quality of microwave popcorn.
- Quality of batteries.
- Flight of paper airplanes or helicopters.
- Strength of glue.
- Roll of a golf ball on a putting green.
- Germination of seeds.
- Quality of golf balls.
- A topic of your choosing.