

## MATH 115 STATISTICS GROUP PROJECTS

**Overview:** During the last two weeks of classes, you and two partners will turn in a statistics project. The project will consist of a short (4 or 5 pages, including figures and tables) paper and a 10-15 minute in-class presentation. The paper is due at the beginning of class on Monday, December 11; the presentations will be the week of December 4. The exact time of your presentation will be determined later, so you should be prepared to present as early as December 4. All members of the group get the same grade.

**Content:** You will pick a question of interest to you, and use statistical methods to try to answer it. You can either conduct an original experiment or analyze an existing dataset. You must use some of the techniques that we learn in class, and you may not do a survey. **At least one of your variables must be quantitative.**

Your report should include the following.

- (1) *Statement of the question.* What problems did you set out to investigate? What were the key issues?
- (2) *Background.* Is there anything we need to know before thinking about your project?
- (3) *Method of collection.* What did you do? How? Give enough information about the collection of your data (whether you collected it yourself or not) to allow readers/listeners to assess its strengths and weaknesses. For an experiment, how did you assign subject to treatments? Was there blinding? For an observational study, how did you control for lurking variables?
- (4) *Method of analysis.* How did you analyze the data and derive your conclusions? Did you specify an analysis plan before you collected your data? What statistical techniques did you use – graphical techniques, correlations, regressions, hypothesis tests, confidence intervals, comparisons, chi-square or ANOVA tests?
- (5) *Results and conclusions.* What did you find out? Did you answer your questions? Construct graphics, if you can, to make the evidence clear.
- (6) *Discussion and critique.* How sure are you of your results? How sure should we be? If there are alternative explanations or grounds for doubt, describe them fairly.

**Pilot study:** It may be a good idea to conduct a small pilot study to try out your data collection/analysis technique(s). In practice it's common to spend 10% to 15% of one's resources on such a pilot study in an effort to gather preliminary information so that the main study will have a better chance of being successful. Often adjustments are made to the study between the pilot and the main study (for example, deciding to take data on other variables that may be observable).

**Topics:** The most important thing is to pick a topic that you find interesting, but if you need help getting started thinking about it, here are some sample topics. (You should have no trouble coming up with something less lame than these.)

*Experiments:* 1. Compare two brands of stain removers. 2. Determine how many licks it takes to get to the center of a Tootsie Pop. 3. Conduct a taste test between bottled water and Brita-filtered water. 4. Test whether people can distinguish between the quality of CD's and MP3's. 5. Compare heart rates before and after consumption of Count Chocula. 6. Test different measures to keep squirrels off a bird feeder. 7. Compare the time it takes to travel two different routes (e.g., by car).

*Observational Studies:* 1. Compare time spent on athletics at Agnes Scott for different sports. 2. Evaluate the weather forecasts for high and low temperature predictions. 3. Compare the fraction of front-page space devoted to local, national, and international stories by the Atlanta Journal-Constitution, Washington Post and New York Times. 4. Determine what variables best predict team success in baseball (or some other sport). 5. Compare the length of commercial breaks for sporting events and for other programs. 6. Try to estimate the number of squirrels that live on campus. 7. Compare the widths of parking spaces and/or vehicles in different parking lots. 8. Compare gas prices for different companies and different locations.

**Paper:** It should be 4-5 pages typed, including figures and tables. For many of you the write-up will include more information than you will be able to present (those 15 minutes will fly by!). The paper should be written in complete sentences, with correct grammar and punctuation. It should read like a research paper, not like a homework assignment. You are free to use any word processing software that you like, but Microsoft Word has an equation editor that may help with the writing. Lastly, it is very important to cite any outside sources and to include a bibliography. If you use existing datasets, be sure to cite them. Be aware of Agnes Scott's strict policy on plagiarism!

Your paper will be graded on the following criteria:

- (1) *Content:* Do you address all of the issues in the assignment?
- (2) *Self-containedness:* Can the paper stand on its own? That is, can the paper be understood by someone who didn't see the presentation?
- (3) *Style:* Is the paper well written (including punctuation and grammar)? (For example, don't use words like "self-containedness.")
- (4) *Citations:* Are all outside sources cited appropriately? Is there a bibliography?
- (5) *Graphics:* Are your tables and figures clearly labeled? Are they easily understandable? Do they add to the paper?

**Presentation:** Each presentation should last at least 10 and at most 15 minutes. All three group members are responsible for presenting. Your presentation can be as high- or low-tech as you'd like. Feel free to use the chalkboard, the computer projector, the document camera, the internet, Powerpoint, physical demonstrations, etc. You have a lot of freedom. Be sure to practice before you give your talk; you may find it more difficult than you expect, especially the timing.

Your presentation will be graded on the following criteria:

- (1) *Overview:* Do you make clear at the beginning what questions you're addressing and how you'll address them?
- (2) *Content:* Do you address all the issues in the assignment?
- (3) *Clarity:* Is all new terminology and notation defined? Are your tables and graphs clear? Do you have a good balance between oral and visual information?
- (4) *Style and organization:* Is the talk polished? Does it look like you have practiced it? Is the talk well organized and well planned? Did all three members participate in the presentation?

**Hint #1:** It's a very, very, very good idea to visit the Speaking Center while you're planning your presentation.

**Hint #2:** One of the most common mistakes that students make in presentations is rushing through the introduction. Make sure to spend plenty of time setting up the problem. Remember, the audience won't care about the answers you're giving if they don't understand the questions.

**Proposal:** Proposals should be emailed to me (jwiseman@agnesscott.edu) by 3:30 pm on Friday, Oct. 13. The email should be plain text only – no attachments! (In particular, no Microsoft Word documents. Don't get me started on the evils of emailing Word documents – if you care, you can look at <http://www.gnu.org/philosophy/no-word-attachments.html> .)

Your proposal should include:

- The names of the three people in your group.
- The question(s) that you're trying to answer (include any necessary background information).
- What data you'll use – where you'll find them or how you'll collect them.
- How you'll answer your questions (methods of analysis). (Since we're learning new techniques, you can leave some gaps in this part to be filled in as we go along.)

**Timeline:**

- **Friday, October 13.** Email me project proposals by 3:30 pm (plain text only – no attachments).
- **Monday, December 4 – Friday, December 8.** In-class presentations.
- **Monday, December 11.** Papers due at the beginning of class.