

## Assessment Plan

The Guidelines for Assessment and Instruction in Statistics Education (GAISE) (<http://it.stlawu.edu/~rlock/gaise/>) includes recommendations on using real data and using technology for developing conceptual understanding and analyzing data. Quoting from that report:

“It is important to use real data in teaching statistics, for reasons of authenticity, for considering issues related to how and why the data were produced or collected, and to relate the analysis to the problem in context....An important aspect of dealing with real data is helping students learn to formulated good questions and use data to answer them appropriately based on how the data were produced.”

In addition to improved student learning, we are interested in the effect on student attitudes. The attitude survey measures not only how students feel about statistics, but how important they think statistics is in their field of study. This is an important component of a student’s motivation to learn statistics.

We expect this project to provide concrete data on

- How use of real data, including large data sets, contributes to student learning and attitudes.
- How use of software contributes to student learning and attitudes.
- How use of *user-friendly* software contributes to student learning and attitudes (as opposed to the software currently being used in ST 370).

Use of real data is widely accepted in the Statistics Education community as beneficial to student learning and attitudes, but no concrete data are available. The software and report-writing aspects have implications in fields other than statistics. We are unaware of any other project to assess student learning outcomes using StatCrunch. Due to its increasing popularity, this will also be of interest to the Statistics Education community. Assessment will be coordinated primarily by Pam Arroway for ST 370 and by Roger Woodard for ST 311.

## Learning Outcomes

1. Students will be able to calculate statistical summaries of data sets, including mean, standard deviation, median and quartiles.
2. Students will be able to generate and modify statistical graphics, including histograms, boxplots and scatterplots.
3. Students will be able to create and interpret statistical analyses for relatively large data sets.
4. Students will be able to write a report that describes the statistical analysis of a data set, including appropriate numeric and graphical summaries.
5. Students will be able to write a report using methods of statistical inference, interpreting the inference in context.

## **Assessment of Learning Outcomes**

Learning outcomes #1-3 will be assessed using out of class homework assignments. Students will be given data sets to analyze. They will be assessed on their ability to construct numeric and graphical summaries.

Learning outcomes #3-5 will be assessed using written report assignments in ST 370. An example assignment will have a student collect data from sources available via the internet, e.g., a study of home prices in Wake County by collecting data from the Wake county government website, data from the Center for Disease Control's national surveys of health, or data from Amazon.com to compare book prices with the bookstore. Students will be assessed on their ability to choose appropriate numeric and graphical summaries, conduct appropriate statistical inference and present the results of the analysis in context.

### **Baseline Data:**

*ST 370:* Baseline data are available for ST 370 on all 5 student learning outcomes for Fall 2005. More baseline data will be collected on all outcomes in Spring 2006 in those sections which do not implement StatCrunch. Note: The course already includes a report writing component.

*ST 311:* Baseline data are available for ST 311 on outcome #1 for Fall 2005. Data will also be collected in Spring 2006 and Fall 2006. Outcomes #2-5 can not be assessed in the current course. Without computing and without a report writing assignment, students cannot achieve these learning outcomes.

### **After implementing StatCrunch:**

*ST 370:* Outcomes #1-#5 will be assessed in Spring 2006, Summer 2006, Fall 2006 and Spring 2007 in all sections.

*ST 311:* Outcomes #1-3 will be assessed in Spring 2007.

## **Assessment of Student Attitudes towards Statistics**

### **Baseline Data:**

*ST 370:* Baseline data for the attitude survey will be collected in ST 370 in Spring 2006 in those sections that do not implement StatCrunch.

*ST 311:* Baseline data for the attitude survey is available for ST 311 for Fall 2005 for 11 sections (around 700 students). Further baseline data will be obtained in Spring 2006 and Fall 2006 in ST 311. Baseline data

### **After implementing StatCrunch:**

*ST 370:* The survey will be administered Spring 2006, Summer 2006, Fall 2006 and Spring 2007 in all sections.

*ST 311:* The survey will be administered in Spring 2007.

		Spring 2006	Summer 2006	Fall 2006	Spring 2007
ST 370 (Arroway)	Implementation	Pilot StatCrunch in one section of ST 370	Convert ST 370 labs to StatCrunch, continue pilot in Summer Session	Implement StatCrunch in all sections of ST 370	Continue implementation and development as needed of StatCrunch materials
	Assessment	Assess all student learning outcomes in multiple sections.	Assess all student learning outcomes (1 section available)	Assess all student learning outcomes in multiple sections	Assess all student learning outcomes in multiple sections
	Attitudes	Administer Attitude Survey all sections	Administer Attitude Survey all sections	Administer Attitude Survey all sections	Administer Attitude Survey all sections
ST 311 (Woodard)	Implementation			Develop materials for ST 311.	Implement StatCrunch in all sections of ST 311
	Assessment	Collect baseline data on outcome #1 in multiple sections		Collect baseline data on outcome #1 in multiple sections	Assess learning outcomes #1-#3 in multiple sections
	Attitudes	Administer Attitude Survey all sections		Administer Attitude Survey all sections	Administer Attitude Survey all sections