

# Panel on Teaching

Jason Schweinsberg  
(University of California, San Diego)

I have taught Math 11/11L at UCSD from 2006-2010:

- Introductory probability and statistics course.
- Includes a weekly computer lab.
- De Veaux, Velleman, and Bock. *Stats: Data and Models*.
- Enrollment 140-200 students.
- Students have taken Calculus.

# 1: Your First Class

A common mistake is to set expectations too high, or try to implement too many creative ideas, during one's first teaching experience.

Instead, stay close to what has been done before.

Try to obtain information about the textbook, homework, and exams that were used for your course in previous years.

## 2: Organizational Tips

After each class, write some brief comments about the class to supplement your class notes.

Keep a folder containing data sets that you have used in classes. For each data set, keep a separate text file documenting where the data came from and what the variables mean.

Organize the data sets by topic. Possible data sources:

- The Data and Story Library: <http://lib.stat.cmu.edu/DASL/>
- OzDASL: <http://www.statsci.org/data/>
- JSE Data Archive:  
[http://www.amstat.org/publications/jse/jse\\_data\\_archive.htm](http://www.amstat.org/publications/jse/jse_data_archive.htm)
- Quantitative Environmental Learning Project:  
<http://www.seattlecentral.edu/qelp/Data.html>

Put each student's score on each exam question in a spreadsheet. Then you have data on how well students did on each question.

### 3: Focus on Concepts, not Calculations

Students tend to do well with computational questions. On the 2008-2010 exams:

- 81% correctly solved a Bayes rule problem.
- 79% correctly carried out a chi-square test for independence.
- 78% correctly found a 90% confidence interval for a mean.
- 100% could make a correct prediction using a regression line.

However, students tend to do poorly with conceptual questions, which are more important.

## Interpreting a Confidence Interval (2006 Midterm)

Suppose that, in a random sample of 76 college students in the U.S., the average GPA for the students was 2.96 and the standard deviation of the GPAs was 0.47.

a) Find a 90% confidence interval for the average GPA of all college students in the U.S.

b) Do you think that approximately 90 percent of all students in the U.S. have GPAs within the interval you calculated in part a)? Explain your answer in a sentence or two.

**Results:** 40% answered part b) correctly.

## Understanding the $p$ -value (2007 Final)

Fifty elementary school students participate in a summer reading program. You want to determine whether the program improves their reading performance. Their scores on a standardized reading test are recorded at the beginning at the end of the summer. You conduct a paired  $t$ -test using these data, and get the following output from MINITAB ...

a) Explain carefully what the  $p$ -value of 0.064 means in this context.

**Results:** 36% gave a correct explanation.

Note: In a 2002 introductory course at Cornell, only 11% of students (2 of 19) gave a correct answer to a similar question.

Note: In a Mathematical Statistics course at UCSD, only 37% gave a correct answer to a similar question.

## Understanding the Central Limit Theorem (2007 Midterm)

a) Suppose 10 people in California are chosen at random, and their ages are recorded. These 10 ages are then plotted in a histogram. In view of the Central Limit Theorem, would you expect the histogram to look like a symmetric bell-shaped curve? Explain your answer in a sentence or two.

b) Suppose instead 1000 people in California are chosen at random, and their ages are recorded and plotted in a histogram. This time would you expect the histogram to look like a symmetric bell-shaped curve? Explain your answer in a sentence or two.

**Results:** 24% answered both parts correctly.

# 4: Importance of homework

Homework is probably the most important part of any undergraduate course, and therefore homework assignments must be chosen carefully. Two reasons:

1) Students learn primarily from what they do, not what they hear in lectures.

2) Homework assignments, if graded seriously, can compel students to devote more time to the course. In the absence of such motivation, most students won't study sufficiently:

- Most universities expect students to devote 12 hours per week to each course.
- According to the 2011 National Survey of Student Engagement, the average college senior spends only about 15 hours per week studying outside of class, for all classes combined.