The American Chemical Society (ACS) Division of Chemical Education (Chem Ed) Examinations Institute (found at <http://chemexams.chem.iastate.edu/>) has several standardized examinations in various disciplines of chemistry. These exams can be found by following the “Exams” link on the webpage aforementioned.

For General Chemistry (our CHM 1311 & 1312 lecture course sequence), there are specialized exams for each semester as well as exams that cover the full year course (found by clicking “General Chemistry” on <http://chemexams.chem.iastate.edu/materials/exams.cfm>). We recently chose an exam that covered the full year course material, but was only an hour long (55 minutes)—GC06B. Since the students taking this exam are doing so voluntarily in exchange for the hopes of scholarship money (more on that below), the collected faculty members of the Department of Chemistry decided that a one-hour exam would have more takers than a two-hour exam.

The exam (Stock Code GC06B, Title: General Chemistry 2006 (brief) – a short test for the full year course) is a 50 question, multiple choice timed examination. The exam is confidential, so I cannot provide a copy. There are 5 questions on “Atomic Structure”, 5 questions on “Molecular Structure”, 5 questions on “Stoichiometry”, 6 questions on “Energetics” (thermodynamics), 4 questions on “Dynamics” (kinetics), 5 questions on “States of Matter/Solutions”, 6 questions on “Equilbrium”, 4 questions on “Electrochemistry and Redox”, 5 questions on “Descriptive Chemistry/Periodicity” and 5 questions on “Experimental”.

The ACS Chem Ed Examinations Institute collects data on all examinations given and reports statistical data for every examination. They completed data collection for GC06B mid to late last year. The mean for the 50-question test is 27.45, standard deviation () 8.08, the median is 26.0, KR21 is 0.83 and Std error/meas 3.36. Thus, one  below the mean is 19.37 (and a score of 19 is the 16th percentile) and one  above the mean is 35.53 (and a score of 36 is the 83rd percentile).

One last issue to address is the scholarship money. For the past two years, we offered $250 to the person making the highest score on the exam in any semester. We also offered $200 to anyone scoring in the 85th percentile (or higher), $150 to anyone scoring in the 75th to 84th percentile, and $100 to anyone scoring in the 50th to 74th percentile. We did the same thing this year.

We had four students take the exam at the end of the fall semester (on Thursday, December 8, 2011), scoring 23, 21, 15 and 13 (one was a chemistry major (scoring 21) and three were forensic chemistry majors). There were 4 chemistry majors and 17 forensic chemistry majors who were invited to take the examination (1/4 = 25% chemistry participation; 3/17 = 18% forensic chemistry participation; 4/21 = 19% overall).

We had 13 students take the exam at the end of the spring semester (on Thursday May 3, 2012), scoring 42, 32, 29, 27, 25, 23, 23, 18, 17, 16, 15, 15 and 14 (11 were forensic chemistry majors and 2 were chemistry majors). There were 10 chemistry majors and 34 forensic chemistry majors who were invited to take the examination (2/10= 20% chemistry participation, 11/34 = 32% forensic chemistry participation; 13/44 = 30% overall participation). Nine of the 17 students in both semesters scored one standard deviation below the mean or higher—9/17 = 53% (all 8 who didn’t were forensic chemistry majors); 4/17 = 24% scored at the mean or higher and 6% (1/17) scored higher than one standard deviation above the mean. Overall, the participation rate was 3/14 = 21% for chemistry majors, 14/51 = 27% for forensic chemistry majors, and 17/65 = 26% overall.