Summary of Statistical Findings for Fall 2007 COP 3223 Section 3

1) Males and females did equally well in the course, both averaging about 78% in the course.

2) There was a correlation between previous programming experience and course grades. In particular, students with both programming experience and scripting experience averaged 82% in the course. Students with no experience in either averaged 75%. Students with prior programming experience but no scripting experience averaged a 77.5% in the course while students with no prior programming experience but with some scripting experience averaged a 81% in the course. This is counterintuitive, but I think there are two possible explanations:

i) Those with scripting experience probably got this on their own, and are natural "computer dorks" whereas those who have programmed before probably learned to do so in school and may not spend time with the computer outside of class. (I was personally in this latter group.)

ii) Those with programming experience are biased by the syntax in their language and have more difficulty than those who have only scripted to pick up the new syntax of C. The reason a scripting language helps is that it introduces students to the ideas of boolean logic, sequential execution, variables and loops (maybe?). So, these students have the ideas, but the syntax of C is so different, they treat it as something new to learn. The reason students who do both aren't hampered is that these are the best students with the most experience in the class, which overrides the effect of getting confused by syntax.

3) The data separated by race is inconclusive, since there are so few non-Caucasians in the course. Most likely, just as in gender, race has no effect on course grade. (For the record, the Asian students in the class had an 81% average, the Hispanic students in the class had a 80% average, the Caucasian students in the class had a 78% average, and the African-American students in the class had a 77% average.)

4) As expected, class room attendance is correlated with course performance, but not in the manner it was expected. In particular, students who attended class 80-100% of the time had an 81.13% average in the course, while students who attended less than 80% of the time had a 74.61% average in the course. There is very little difference in course average for students who attended 60-80%, 40-60%, 20-40% and 0-20%. Thus, coming to class matters, but in order for it to have a positive influence, you really need to come almost ALL of the time. (If you come sporadically, there's a loss of continuity which affects understanding.)

5) There was virtually no difference in grades depending on how often students attended office hours. This was somewhat surprising, but a possible explanation is that students come to office hours for various reasons and some students don't come simply because they don't need to. Others don't come even if they do need to for various reasons. Thus, when looking for correlations, one can not isolate whether or not office hours helped students, since you may be comparing students who came to office hours with ones who didn't go to office hours, who didn't need to in the first place. My hope of course, is that office hours do help.

6) Students had the option of coming to office hours to improve their weekly quiz grade by completing a short program under the supervision of a TA who could help them. Some students who got very good quiz grades didn't need to do this option. Although the data doesn't show a strong quantitative correlation between number of quiz programs completed and course grade, there was a CLEAR correlation between those who did at least one quiz program and those who did not. (The graph does steadily decline, but it bounces up and down a bit, kind of like one of those wavy Wet-n-Wild rides. I could calculate the correlation coefficient, but I like this description much better.) In particular, those who completed at least one quiz program averaged 80% in the course, while those who completed none averaged 74% in the course. Furthermore, those who completed at least one quiz program had a program average of 88.72% while those who did not had a program average of 81.94%. Thus, we can conclude that some participation with the quiz programs directly correlates with learning how to program better. Interestingly enough the exam average of those who completed zero quiz programs is 2% HIGHER than those who completed at least one. This means that the skills involved with writing programs are DIFFERENT than the ones that are tested in the exams. (Which is the way it ought to be, since different assessments ought to test different things!)

7) Completing at least one quiz program mattered MOST for the beginning students with NO prior experience (duh!) In particular the course average for beginning students who completed at least one quiz program was 78.61%, which is a hair higher than the overall course average. But the course average for beginners who didn't complete any quiz programs was 69.11%. Thus, it's very, very important for beginning students to get extra programming practice. Incidentally, the average exam scores between these two groups was no different, but once again the program scores were remarkably different. The program average for beginners who completed at least one quiz program was 89.15%. The program average for beginners who did no quiz programs was only 77.26%. Both of these gaps of, 9% and 12% respectively are quite significant.

8) A graduate student, Rochelle Elva, wanted to try an experiment with my class where half of the students would attempt doing a design document to help them prepare for their programming assignments and the other half would not. Some correlations were found between the groups of students and within the group that did the design documents. In particular, those students who attended Rochelle's one thirty minute session had a 5% higher course average than those who didn't (81% to 76%). Furthermore, if we just look at the design document scores of the students who did them, then there was a strong correlation between these scores and the course scores and program scores. For example, those who scored 41-50 had an 89% average in the course, those who scored 31-40 had an 84% in the course, those who scored 21-30 had a 80% in the course, those who scored 11-20 had a 82% in the course and those who scored 1-10 had a 65% in the course. As a whole, the average course grade for all students who were supposed to do the design documents was 79.29%. The average course grade for all students who were not supposed to do the design documents was 77.57%. This difference is too small to draw any conclusions. However, there's a clear correlation between course grades and the design document grades; most likely this indicates that the best students are the ones more likely to take the time to turn in good design documents. It's hard to determine if causation is involved, but I think trying to get students to do these documents will indeed improve students' understanding of the course material.