STATEMENT ON TEACHING

DANA D. CLAHANE

I have taught (not as a T.A.) the following courses as of Winter 2006:

complex analysis (first-semester, graduate)	probability/statistics (second quarter, upper-division)
applied linear algebra	applied differential equations
multivariable calculus	second-semester calculus
first-semester calculus	precalculus
trigonometry	finite mathematics
applied calculus	liberal arts mathematics
mathematics for elementary education majors	intro. to probability and statistics (service course)
college algebra	intermediate algebra
plane geometry	elementary algebra
prealgebra	basic arithmetic

I have taught most of these courses several times, and I have also been a teaching assistant for other courses, such as applied complex analysis (undergraduate level). Having been a full-time community college instructor for many years, I have spent considerable energy on finding suitable modifications of my teaching practices so that students are maximally engaged with the material that is taught. On my website, I post a course outline/grading policy, a day-to-day schedule, and tips for studying/organization, and I prepare these items with the objective of creating within students a true desire to learn by completing the course requirements.

For example, in many university courses, student attendance can be a significant problem if it is not addressed with an effective strategy. My department, not unlike others, has engaged in a discussion of this issue, keeping in mind that the workload of TA's must be sensitively balanced with the need to involve one's students in meaningful assignments or quizzes. One strategy that was suggested by a faculty member recently is to give an unannounced number of very short pop quizzes in service courses, inversely varying the number of quizzes with classroom attendance. I will try this strategy in the next term, while continuing to collect daily homework assignments.

While some of my teaching practices have been in flux from time to time, I can certainly summarize some of the other major strategies that I have implemented. First, I believe that timely preparation is crucial, so I do not leave my office for the day before my classroom activities and documents (lecture notes, tests, etc.) for the next two class meeting days are completed. Unlike mathematical research, teaching tasks are regular and finite, so I like to clear my head for focus on research by completing my out-of-the-classroom tasks first. I write detailed lecture notes in LaTeX with definitions, theorems, formulas and at least one example of each, and I revise these notes in future semesters/quarters as I repeat teaching of the same course. I have not yet been able to conclude whether or not posting the notes to my webpage is effective. For diligent students, this practice seems to be helpful and appreciated, but students who are less motivated can mistakenly see reading of the notes as a substitute for classroom attendance. Perhaps the new pop quiz strategy will eliminate this dilemma! The most important advantages in preparing the notes in LaTeX are that I feel extremely well-prepared for each class and that I can easily revise past versions of the notes, which are intended to be textbooks in some cases. Presently I am collaborating with Kevin Scully (Ph.D., UC San Diego, 2002, now at the Aerospace Corporation) on a calculus text,

for which we have completed about half of the chapters, and I have similar drafts in linear algebra, finite mathematics, college algebra/trigonometry, probability, and statistics.

When it is applicable, I post material concerning help with technology in a given course. Since I believe that homework is crucial for students, I assign one to three hours of homework for every hour of class and collect these assignments at the beginning of each class meeting. How much of the homework is graded depends on whether or not I have assistants, but I have found very efficient ways to motivate students to work diligently on these assignments while keeping grading workloads manageable. I have incorporated technology such as graphing calculators, MATLAB, and Maple into relevant parts of my courses when these tools are appropriate and time permits. Last year I also began to use some power point/pdf presentations in my teaching. After having tried this technique as a principal mode of instruction in Spring 2005 for the first time, I am very happy with it, but in the future I plan to balance it with a return to my previous, principal classroom method: chalkboard lecture/discussion/practice sessions. I have decided on this readjustment because it seems to me that students benefit greatly by seeing problems methodically worked out in detail on a board, at least in my classes (this of course may not be true for other instructors).

My lectures usually consist of three parts: First, I attempt to provide an interesting motivational statement for the topic that is being presented. The second part of the lecture consists of a careful development of definitions, theorems, and/or formulas, with at least one example of each. If time permits, I spend the remainder of class alternating between proofs or intuitive justifications of the theorems and more involved examples. In lower-level courses, I am occasionally able to complete this last stage with significant classroom time remaining, so in these cases, I spend this time assigning practice problems and providing students with assistance as needed.

Because I value detailed board work during my presentations and student involvement in classroom discussions, I have to be equally careful about managing classroom time. This approach must be balanced with efforts to maximize the scope of what is discussed in class so that students have a solid foundation for successful completion of the homework. With each year of postdoctoral experience, I am definitely getting closer to a genuine balance, but I am sure that this issue will always be something that I need to think about carefully, especially before teaching a course for the first time. Presentations should be methodical and detailed; however, students need to see as many carefully worked examples as possible.

I want my teaching to be characterized by clarity, cohesiveness, knowledge, and patience. My presentations are easy to understand, and students always feel comfortable asking questions in my courses. However, I don't think that I have spent enough effort developing strategies (other than course requirements like daily homework and solid exams) to get students purely motivated for mathematical study. Motivation by a grade or some other requirement is not motivation that I consider "pure". I now believe that one of my most important duties as a teacher is to leave students at the end of class meetings with a genuine desire to continue learning mathematics. Elegance of explanations, sparing amounts of good humor, careful crafting of examples, verbal and written affirmation of student questions/comments/work, and phone calls/emails to missing students can be very effective in this direction, and my search for other motivational tools continues.