TEACHING STATEMENT

Philosophy. Ever since being asked to help a fellow student with his computations in the fourth grade, I've known that I wanted to be a math teacher. Throughout the rest of my schooling, I tried to imagine teaching the courses myself, and what my philosophy would be. My principal has always been sports, more specifically, being a "mathelete's personal trainer!" The underlying idea is simple: Very few people who stick with a proper workout routine don't see the results they want after time. Sure, in the beginning, they may be sore, tired, wanting to quit; but those who stick it out, love the results. I apply this same concept in my teaching. I want to build confident, strong students, capable of being fine young mathematicians, or simply giving them the confidence to use mathematics in their daily lives. Math is a contact sport, so you need a contact attitude to succeed!

What I really try to tap into is a person's competitive spirit. Now, I'm not trying to breed competition among students, but rather have each student set their own personal goals, and hopefully, go beyond these goals. Just as with any training for any sport, it becomes difficult at times and it isn't clear why one is working so hard. Having these goals, constantly asking students where they want to be in a few years, reminds them of why they're working so hard. I try to push the most important muscle in their body, the brain, expanding their mathematical knowledge, and most importantly, their confidence. I always tell my students if they don't come out of my class with their hands cramping, heads hurting and minds racing with new ideas and questions, I've done something wrong.

Introductory Courses. Imagine a 50 minute workout session where the trainer spends the first 15 minutes explaining the theory behind an exercise idea, 20 minutes proving the validity of the exercise, only a few minutes actually doing the exercise, and then gives you 30 other exercises related to the one just learned to do own your own at home. Even if you perfectly understood the ideas of the exercise, it would be difficult to execute the new exercises precisely at your home. Moreover, it would be unlikely that you would be able to do as many repetitions on their own the first time. This is how I try to schedule my daily lectures for most undergraduate math courses. Instead of a lengthy δ, ϵ-style proof, usually a picture and a quick question/answer session will get the major ideas of the day across. Then, its off to examples after examples of the new ideas. Thought I do not believe quantity is more important over quality, I do feel that an instructor can cover a wide arrange of worthy problems, setting their students up for success on their own work. In general, I try to cover lots of problems other faculty would assign as homework problems, and focus more on "critical thinking" style problems and applications for students on their own. I do always give a few "warm-up" problems to remind the students of the techniques needed, and then off to "mind-stretching" exercises.

As an example, the ratio and root test for series is usually the last convergence test covered. Instead of giving a geometric series argument for convergence, we can simply explain what it means if the ratio (absolute value) is less than, equal, or more than 1 in the partial sums. This discussion usually takes way less time than formal proofs of both these tests. Hence, my class then usually has at least a day and a half to simply work with all the convergence tests, in group work, examples done by students at the board, and on individual exercises at home.

As any good personal trainer, I am always focused on different teaching techniques and new approaches. While being a CU Succeed instructor, I developed the curriculum for the College Algebra, College Trigonometry, and Calculus 1 series. As any personal trainer would do, I developed programs that focused on long term goals, making sure important topics needed in Calculus 1 were focused on in previous courses. Moreover, I made sure to include a wide scope of applications in these fundamental ideas. For instance, building group labs that would include ideas that stimulated students who wanted to continue through the calculus series, and students who simply needed a math class to graduate. I employed the "even-team" method, making sure each group had a diverse group of viewpoints and strengths.

The use of technology is critical in the sports world, as it is in mathematics. I certainly use technology when needed, and have very little qualms about it. Imagine a sports trainer who only used free weights, never considering new machines to improve their workout routines. However, as with any tool, one make sure that using technology is tool, not a crutch. When teaching for a technical/trade college, I taught a course that covered Integration, Sequences and Series, multi-variable calculus, and differential equations; all in 12 weeks! Here, it was essential to use calculators and computer programs in class, not simply for calculations, but for several different view points on main ideas and applied problems. I, therefore, developed several new lectures, quizzes, and applied problems, integrating technology and higher mathematics.

Advanced Courses. In these courses, the main goals shift from computational goals to actual proofs, but my principal philosophy remains. Now focusing on higher ideas and deeper concepts, I try to create new "mathelete trainers", or to become athletes in other sciences. Here, as opposed to above, my students would work out rigorously the proofs for the ratio and root test. Though the focus changes from computational work to theoretical, I still feel lots of examples and discussions are needed. My students spend a lot of time at the board working out solutions and giving explanations to their fellow students. The idea is simply: we know everyone in the class is comfortable with calculations, but can the student explain why/how a method works? As before, I'm building confidence in their critical thinking skills as well as their public speaking/explanation.

For example, I taught the first ever Preliminary Exam Preparation courses, in Group Theory and in Rings/Field Theory. Since these section were brand new, I was able to develop the curriculum. For the first five weeks, I would assign problems the week before and then students would present their proofs the following week. Not only were they critiqued in the correctness of the proof, but also in their actual proof and their ability to clearly explain their ideas to following students. The final weeks were spent taking small sample exams in class for 30-minutes, mostly just sketching out the ideas of the questions, and then presenting these, again at the board. Here, we had already built up confidence knowing the right concepts for the exam, and in writing a correct proof, so we wanted to focus on getting to the correct ideas quickly. Therefore, we could focus on quickly recognizing which ideas/Theorems were needed, and how much one needed to show to get a correct proof.

Qualifications. I have been teaching at the university level since 2007, and during that time I have taught 16 courses, ranging from College Algebra, Calculus Series and Preliminary Exam Preparation Courses. I am the sole recipient of the first Graduate Teaching Assistant Teacher of the Year award in 2012. I have consistently received student evaluation scores well above the average.

In terms of development, I have developed curriculum for the Algebra/Trig/Calculus series, as well as curriculum integrating technology and Calculus. I have also developed materials for Preliminary Exam courses. Moreover, I built handbooks full of teaching materials for other Graduate Students, covering College Algebra through the Calculus series. In the Spring of 2013, I will be running a series of seminars for first year Graduate Students on how to teach at the university level.

The following two comments are from student evaluations that I feel accurately sum up my lectures in my math classes:

The course really strengthened my analytical critical thinking skills, as many problems were seemingly unrelated to the topic until further transformations occurred. Mark was a good instructor in that the layout of the class (lots of examples, group work, etc.) varied, thus keeping me interested.

Professor Greer showed a wide variety of enthusiasm and knowledge on the material covered in this course. He had a good sense of humor and treated math like an engaging activity and not just a dry subject matter. The course was done at a nice pace that allowed for time to move quickly without becoming overwhelmed.

As I stated before, my main philosophy is to tap into a persons competitive spirit; to push them in class with lots of examples; build confidence in their ideas; and to have strong "matheletes" when the course is completed.