Philosophy Of Teaching – Jeff Kallenbach

I will preface this document by remarking that I have positioned myself well to be "successful" at this profession in that mathematics is such a rich and beautiful subject that it doesn't require a lot of bells & whistles from the instructor to make it enjoyable. But there are some concepts and techniques that I've picked up over the years that transform the merely beautiful into the exquisite.

The first concept that I make sure to convey to each class is that the particular material we will study that semester is not a stand-alone topic. While we will organize the semester into a coherent unit, in fact that unit is merely part of the large universe that is mathematics. Following up on this concept, I make sure to emphasize that they should not treat every problem that we encounter as an entirely new entity to be learned; in fact, it's very likely a slight extension of something we've already learned, and further down the road we'll probably extend this new concept just a little bit to tackle something else. Then, as the semester progresses (or even from one course to the next), I find that by setting up a problem and asking them to apply a previous technique to what is now in front of them, I am able to let the students work their own way through new topics.

The second important concept that governs my classroom is collegiality. One of our Learning Outcomes states that, "Students will effectively communicate mathematics to others, both in writing and speaking". To make sure that this outcome is met, my courses are heavily discussion-oriented, and the students do brief presentations of their work – at least one student presentation takes place nearly every class period. In order for such a student-based format to work smoothly, the room must be a friendly and polite environment. I attempt to be personable and encourage the students to speak frankly about whatever is on their minds as it relates to the material. We make sure to have a laugh when I make a mistake, as that leads to less inhibition among the students when it is their turn to present some material. When a student comes to class with a question, we generally start the ensuing exposition with that student getting as far as (s)he can on the problem. If a mistake is made we make sure to point it out in a friendly manner (one of the students usually spots the problem), and have the original presenter fix the error. I'll then ask another member of the class to continue, and so on until we make it to the end. Even when I am doing the writing, students do most of the thinking. This process results in a discussion-oriented setting where all participate in the various aspects of learning.

The third crucial component to my courses is eliciting and verifying honest effort from the students. When one is attempting to learn mathematics, there is no substitute for practice and trial-and-error. What this entails depends a great deal on the particular subject, of course. In an upper level class (from Calculus on up), I expect at least 6 hrs/week from the

students outside of class. In the LAS classes 3-4 is the minimum requirement usually. My problem sets tend to be long and contain a broad spectrum of topic coverage and difficulty level. They are assigned with each new lesson. Our subject is so rich that the range of students' interests and abilities cannot be covered with a few exercises. I normally do not require or even suggest that the students write full answers to all of the problems, just that they do enough to satisfy themselves that they have learned the material. To verify that work is being done daily, written quizzes are given during roughly half of the class periods, taking problems directly from the notes and the homework. A typical semester also contains 4-5 hour exams and a comprehensive final exam. This of course means that I have to read and grade a large number of papers, but I haven't yet found a better way of assessing whether 25-30 students are absorbing the mathematics at an acceptable level. This assessment of daily work and comprehension leads to fulfillment of our final Learning Outcome, "Students will demonstrate mastery of the content of the courses required for the major".

Finally, my teaching and my courses stress engagement and connection with the students as scholars and as people. For example, after hearing the heartfelt complaints from the students regarding the cost (and weight) of textbooks, I was motivated to seek out alternatives. This led me to the American Institute For Mathematics' Free Textbook Initiative. The 2014-2015 academic year will be the 3rd for which I have adopted free digital texts for all of my upper-level and single-section courses. I gave a presentation on my experiences at the 2014 Michigan section meeting of the MAA. I also made my own modifications to a free, open-source textbook for numerical analysis, tailoring it to our specific needs (all of the original author's references to and examples in Octave © software were rewritten for Maple ©, our preferred software at SHU). For a number of years now I have been placing pdf copies of the lesson notes in a location that is accessible to the students, in case they miss class or want to review what happened during our encounter. When possible I make powerpoint outlines of the lessons available before class, so the students don't have to write every word while we're meeting. I typically administer mid-semester course evaluations and discuss the results with the group, making modifications that make sense, and explaining why some of their suggestions won't or can't be implemented. I consider them full partners in the learning process, and I try to listen as well as teach.