Erin M. Kiley: Statement of Teaching Philosophy

I believe that the best mathematics instructors provide context for course content, clear explanations of relevant theory and techniques, and, where it is appropriate, many examples of completely worked problems, all at a level that challenges students without overwhelming them. These instructors use both classical and contemporary pedagogy techniques to keep students motivated and alert, and they give students the resources they need to build their confidence in mathematics. The best instructors in any discipline will also provide individual guidance to students both through written feedback and through personal interactions before and after class, during office hours, and at individual meetings.

I was fortunate in my undergraduate career to have participated in two "studio format" course sequences, both designed under National Science Foundation support at the University of New Hampshire as guided exploratory experiences for students in mathematics and physics. The first of these sequences[1] developed the theory and techniques of calculus only within the context of their applicability to physics problems, using a class format that included three times as much guided group problem-solving as it did lecture. The second of these "studio" course sequences[2] took the place of linear algebra, ordinary differential equations, and multi-variable calculus, following a similar class format to build these concepts only as needed for the study of linearization and modeling (mostly of dynamic phenomena). These courses taught me the importance of context in the study of mathematics, and even when I am required to instruct using a more traditional lecture and curriculum format, I always try to provide motivation for course material within contexts that interest my students (who have typically been beginning engineering and biomedical sciences majors). Sometimes it is natural to include this context as a lead-in to a lecture, but I also often assign homework problems and longer projects with "real-world" applications.

Providing context during lectures is something I consider a classical pedagogy technique to engage student interest; another such technique I have tried is recounting brief histories about course material (for example, spending an extra ten seconds to mention that L'Hôpital's rule is believed to have been discovered by one of the Bernoulli brothers seems to make students more alert for the explanation of the topic itself). I also have experience using techniques I would consider contemporary, and chief among these is uploading recorded audio and video streams of all lectures to a class web site; this has been necessary when I have instructed online courses, but even for "standard" courses, students report that this is extremely useful to them, and it also has not seemed to affect class attendance.

Because my experience as a primary instructor has been limited to Calculus-sequence courses during summer sessions, I have had several students who began their basic coursework with little mathematical maturity, and a sometimes tenuous understanding of what was necessary to constitute a logical argument or a proof. To address this unique challenge, I found it critically important to provide many examples of clear, logical, and complete work in packets of my own solutions to at least 15 problems per week, annotated where necessary and sometimes supplemented with outside resources. (For example, I often include weblinks to videos or sites that further explain basic concepts like proof by contradiction, or techniques like partial fraction decomposition, which may be missing or weak in some students' backgrounds.) In the student evaluations of my teaching performance, on average 70% of student responses have included positive feedback about these "sample solution packets", so this is a strategy I will continue to employ. The opportunity to provide students what is, for many of them, their very first introduction to logical reasoning, along with their first examples of high-quality, mathematically mature work, is one of the reasons I enjoy teaching introductory courses.

However, I would also appreciate the opportunity to teach more advanced courses; graduate-level numerical methods, or something as specific as a course on computational electromagnetics, or on multiphysics or multiscale modeling, for example, would be directly relevant to my research. I believe that quality research drives quality instruction at all levels, but particularly in graduate and topical undergraduate courses, where students have the background and resources to more deeply consider certain areas of study.

Although I am a relatively new instructor with much to learn from my senior colleagues, I use my own experience and student feedback as a guide for my personal progress, and I believe that my philosophy and commitment to quality teaching and advising will enrich your department's programs.

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[1] NSF award number 9752485; see http://www.nsf.gov/awardsearch/showAward?AWD_ID=9752485

[2] NSF award number 9752650; see http://www.nsf.gov/awardsearch/showAward?AWD_ID=9752650