Teaching Statement

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Teaching Philosophy

As a mathematics teacher, I impress upon my students that the skills that they acquire in mathematics courses are useful outside the world of mathematics. It is my belief that mathematics teaches creativity and critical thinking, which are powerful tools in any situation. Furthermore, mathematics is ubiquitous in many different fields such as biology, mechanical engineering, and anthropology. Thus, I always motivate my students' desire to learn the material by drawing upon a variety of applications. For example, when I taught an undergraduate course on differential equations at the University of California, Davis, I noticed that the students enrolled in my course were all engineering majors. As a result, I included various applications of differential equations from biomedical, chemical, and mechanical engineering so as to illustrate the relevance of the subject to their own disciplines. I also found motivating examples especially useful when teaching mathematics to biology students. For example, when I was the teaching assistant for the Collaborative Learning at the Interface of Mathematics and Biology (CLIMB) program, I motivated the topic of the diffusion equation by considering populations of animals, or concentrations of molecules, randomly moving between discrete patches. I created a worksheet illustrating these ideas, which the students worked through to ultimately derive the diffusion equation. By relating the diffusion equation to a concrete biological application, the students were able to grasp the concept more effectively.

I believe that students learn more from actively solving problems than from passively absorbing information from lectures. My classes consist of introductions of concepts followed by numerous examples worked out by both myself and the students. When working through examples at the board, I involve the class in every step, as much as time allows. I accomplish this by reminding the students where we are trying to go and asking them for their input on what the next step should be. The aim of this format is to create an environment where students can learn the logic behind problem solving and to learn to think rather than just memorizing an algorithm to solve problems. When students work through examples, I encourage them to work in groups, and I walk around the room to help them when needed. This allows my students time to digest the material, learn from each other, and ask me questions that they might not want to pose to the entire class.

I am also aware that different students learn in different ways. For example, some students may learn best from lectures, while others might learn best from working together with their peers. As such, I make certain that several resources for learning are available for my students: the first resource is myself as I always make ample time for office hours and scheduled consultations outside of the class; the second is their peers as I encourage them to work together in and out of the classroom; the third is the textbook, which is a resource for worked out examples to supplement my lectures; and the fourth is my lecture notes, as I always draw upon examples that are not from the textbook to offer the students an extra resource.

Teaching Experience

Department of Mathematics, University of California, Davis

- Instructor for the undergraduate course Differential Equations (Math 22B). I was fully responsible for this course. This included lecturing, writing and grading the quizzes and exams, and assigning grades.
- Teaching assistant for two quarters of the Calculus for the Biosciences course (Math 17 A, C). My responsibilities for this course included holding an hour long discussion section every week, holding office hours, writing homework solutions, and grading exams. I have also been the teaching assistant for the upper-division undergraduate courses Ordinary Differential Equations (Math 119A) and Mathematical

Biology (Math 124). These courses required holding office hours, writing homework solutions, and grading homework and exams.

Department of Neurobiology, Physiology, and Behavior, University of California, Davis

- Teaching Assistant for the undergraduate/graduate course Computational Neuroscience (NPB 167/267). My responsibilities for this course were to grade assignments and to help with tutorials for project-related computer programs, such as NEURON and Matlab.

Department of Evolution and Ecology, University of California, Davis

- CLIMB (Collaborative Learning at the Interface of Mathematics and Biology) Teaching Assistant. This was a year-long program in which I mentored seven select undergraduate students from mathematical and biological backgrounds. At the beginning of the program, I provided assistance by lecturing and working individually with the students as they learned the concepts behind mathematical biology. I then worked with them as they formulated their own idea for a research project, making sure that each student was active in developing the proposed topic. The students ultimately decided on a project involving the role of vaccine scares on the dynamics of measles outbreaks in the United Kingdom. During the summer, I supervised the students as they carried out their research project, and provided support to help them get through the various roadblocks they encountered. This involved helping them with the formulation of their mathematical model, the implementation of the model in Matlab, and interpretation of their results. I also helped the students prepare their presentation which they gave to invited experts in the field of epidemiology from around the country at the symposium that they organized at the end of the program.

Future Teaching and Curriculum Development

I am qualified to teach any lower-level mathematics course and most applied mathematics courses for upper-division undergraduate and graduate students. My training in interdisciplinary research makes me well suited to teach mathematical courses with applications to the life sciences and engineering. With that in mind, at the graduate/advanced undergraduate level, I could teach the following courses: Mathematical Biology, Numerical Analysis, Bifurcation Theory, Perturbation Methods, Ordinary and Partial Differential Equations, and Mathematical Modeling. I can also teach courses in Computational Neuroscience and Beginning Neurophysiology.

My interdisciplinary teaching work with the Calculus for the Biosciences courses, the CLIMB program, the Mathematical Biology course, and the Computational Neuroscience course not only make me well-suited to mentor undergraduate students in performing research in mathematical biology, but also to develop an undergraduate curriculum in mathematical biology. The exposure that I received to many different areas of mathematical biology through these experiences gives me a large resource to draw upon when creating such a curriculum. The curriculum that I envision will consist of a mathematical biology course that focuses on modeling techniques and results from classical models in epidemiology, neuroscience, ecology, and chemistry, to name a few. This core course would be followed by a more project based course where the students focus on models in a field of their choosing. Students who complete this curriculum would be qualified for working in industrial and pharmaceutical research groups as well as graduate studies in applied mathematics, physics, ecology, genetics, and neuroscience, amongst others. My active attendance of the Mathematical Biology seminar in the Math Department, and of various conferences allows me to stay on top of the cutting edge research that is being performed in mathematical biology. This makes me well-suited to mentor students on research projects with various biological applications.