My career has included several opportunities to educate students both at the bench and in the classroom. In each situation, my central goal has been to nurture the development of excellent problem solving and design skills. My role is not as an information reference but as an impetus for students to develop their abilities to learn and discover. To accomplish this, I apply problem-based learning as well as critical thinking and synthesis challenges in my teaching and mentorship.

As a graduate student at the Massachusetts Institute of Technology, I served as a teaching assistant for Thermodynamics of Biomolecular Systems, a rigorous and challenging undergraduate introduction to the thermodynamics of macroscopic and microscopic systems. My responsibilities included homework and exam development, independent classroom instruction during weekly recitations, and student evaluation through exams and quizzes. This course provided valuable experience teaching in the classroom and managing an undergraduate course. This past year I undertook a more extensive role as an educator as faculty in the Citizen Science program at Bard College, an intensive short laboratory and classroom introduction to science for all first-year students at the college[1]. In that role, I was responsible for the development of all the course material, which provided a unique experience assembling an entirely new class plan. Student engagement is a critical component of learning, and this position included extensive training in inverted classroom methods, student engagement techniques, and course development. I expect to employ these valuable techniques throughout my career.

Outside the classroom, continually during and after my graduate training, I have gained experience training, teaching, and mentoring undergraduates, visiting scientists, and new graduate students and postdoctoral fellows. During my graduate training, I mentored six undergraduate students within my own research project, training them both in good science practices generally and the techniques used in my research specifically. Individual students had very different starting experience—while three had completed considerable research beforehand and wanted to broaden their expertise, the remaining three had never been in a laboratory before but were enthusiastic learners. Higher-level design and interpretation of experiments are perhaps the most important skills in science, and I am careful to develop a plan towards research independence by fostering understanding at every level of the scientific process. Each of these six students made immense progress in understanding the science and their ability to contribute to the project. Two students made essential contributions to the live-cell tracking assay in one of my manuscripts and became coauthors[2]. A benefit of this mentorship has been seeing my students progress in their careers. One is a Ph.D. candidate in the Biological Engineering department at MIT, another is applying to medical schools, a third is a scientific consultant and plans to return to graduate school, and a fourth helps with the scientific discovery process at a law firm. Now leading a research group, I independently mentor a team including undergraduate students, graduate students, and postdoctoral associates whom I advise on all aspects of project and career development.

In my future position, I would like to implement a literature-driven course on quantitative modeling approaches in molecular and cellular engineering, similar to a course taught in the Biological Engineering department at MIT. This course would teach data-driven quantitative methods to understand cellular phenotypic behavior; students would then apply these methods using original data from primary literature. The experience will be valuable for senior undergraduate students who are interested in pursuing careers in biotechnology or academia, as well as for junior graduate students to learn techniques they can apply to various areas of experimental bioengineering. The class would include a weekly lecture on the theory underlying a particular quantitative approach, such as ordinary differential equation simulations, stochastic differential equation simulation, dimensionality reduction, classification, or regression. After introducing the theory, the class would include an in class discussion of a case from the literature employing the same technique. This discussion of the literature would be a central component of the class and would include discussion of the technique's strengths and weaknesses due to the underlying experimental data, the relevant scientific question being asked specifically by the analysis, and what sort of experimental validation could be or was used in evaluating the conclusions of the modeling. After this discussion, the students would reproduce the analysis from the paper and build upon the analysis in a creative manner of their choosing.

Depending on the specific needs of the department, I am also prepared to teach or contribute to the following

[1] Savage, A. F. *et al.* Starting small: using microbiology to foster scientific literacy. *Trends in microbiology* **22,** 365–367 (July 2014).

[2] Meyer, A. S. *et al.* 2D protrusion but not motility predicts growth factor-induced cancer cell migration in 3D collagen. *The Journal of Cell Biology* **197,** 721–729 (June 2012).

courses:

BE 100 Bioengineering Fundamentals

BE 110 Biotransport and Bioreaction Processes

BE CM141/241 Mechanics of Cells

BE CM145/245 Molecular Biotechnology for Engineers

BE CM186/286 Computational Systems Biology: Modeling and Simulation of Biological Systems

BE M296A Advanced Modeling Methodology for Dynamic Biomedical Systems

BE M296B Optimal Parameter Estimation and Experiment Design for Biomedical Systems

I believe educating the next generation of engineers, scientists, and MDs, both inside the and outside the classroom, is an essential component of a dynamic research program. My previous teaching experiences have been incredibly rewarding, and I am confident I have the tools and experience necessary to successfully implement any of these courses. Through these activities, I look forward to continuing my commitment to education throughout my career.