TEACHING STATEMENT
ROSE KEITH

My primary goal as an educator is to help students learn to solve complex problems in biology. This involves supporting them as they build conceptual frameworks and a rich library of biological examples. It also includes frequent practice of problem-solving skills such as synthesizing information, identifying relevant questions, and breaking a complex problem down into pieces that they can solve. Whether students continue in research, medical professions, or other areas, such skills are an essential part of a biology education.

Biological concepts can never exist in a vacuum; everything we study is connected to the science of real organisms. Students struggle to learn without concrete examples; as such, I emphasize teaching real examples that are explicitly connected to our conceptual objectives. This was a particularly fundamental piece of my seminar course Genetics of Species Interactions, in which class time was evenly divided between learning background material and discussions of primary literature articles illustrating recent research in the area. Discussions of the primary literature were also a focal point of my upper-level genetics course; we approached the material from a historical perspective, reading and discussing some of the fundamental papers in the discipline. Although many students found these experiments challenging, by engaging with them they gained a deeper understanding of both the concepts we were discussing and the process of doing science.

I implement student-driven learning in multiple classroom contexts. In my courses that emphasize paper discussions, students were responsible for choosing some of the papers and/or leading discussions, allowing them to choose a topic of interest to them to investigate more deeply. Many assignments also give students freedom to choose their topic within the relevant field. In Genetics of Species Interactions, students developed a novel question about an interaction of their choice and wrote a research proposal. Choosing a topic that they found of interest increased student engagement, and provided them with very valuable experience in synthesizing background information, identifying a question, and designing experiments, all essential skills in any scientific context. As skills such as leading a discussion or devising a research question were new to some students, classwork and assignments included multiple, small-stakes opportunities to practice and get feedback from peers and from me.

For similar reasons, I prefer inquiry-based lab exercises. As a TA, I found that modifying a previously "cookbook" lab to a more inquiry-based model, in which students were given flowering plants and support but devised their own question within the topic of pollination traits, increased self-reported student engagement and learning. As I develop lab activities for my own courses, I emphasize inquiry-based projects in which students will practice both practical and conceptual problem-solving in a scientific context. These have included small projects carried out in one or two lab sessions, such as an experiment investigating plant hormones and seedling growth. This spring, in evolutionary genetics, I plan to have students carry out a larger project, spanning several weeks, in which they will find and analyze a publicly-available dataset to answer a question of interest.

As an instructor, one of my central responsibilities is to improve students' abilities to synthesize central concepts to solve complex problems. I give students opportunities to practice working on problems and giving feedback individually or in small groups during class time and at home. In-class lectures and activities present material in discipline-typical ways, giving students practice interpreting the same materials that experts use. When students struggle, I try to guide them through solving the problem with a series of questions, giving them a chance to observe how I break down problems as well as practice doing so themselves. I also introduce students to a variety of tools for organizing their thoughts and studying the material. While teaching a supplementary section for an introductory course, I have engaged struggling students in a variety of active learning activities, including making phylogenetic trees out of pipe-cleaners, creating a collaborative study guide, and creative activities such as designing organisms within the kingdoms we were studying. I have continued to use similar strategies, incorporating clicker questions, problem sets, and other activities into primarily lecture-based courses, both large and small.

I take equity and achievement gaps in the classroom as critical challenges to address. Acknowledging that innate biases are inevitable, I seek both to understand mine as thoroughly as possible, and to create a course design and classroom environment that minimizes their power. This includes practices such as reaching out directly to all students who perform poorly on the first exam and asking them to come talk to me about strategies for success; this has increased the number of students at my office hours, including students from under-represented groups. I use rubrics to make grading more transparent and less subjective, and incorporate course design elements, such as student-driven and inquiry-based learning, that have been shown to support increased success among under-represented groups. I emphasize a growth mindset, explicitly saying in class that all students are capable of succeeding if they work hard and ask for help when they need it. I seek to create a community in which all students feel welcome as valued members, and to actively discuss issues surrounding diversity in STEM.

My teaching and research experiences have included topics in evolution, ecology, genetics, and plant biology, at both introductory and upper levels. I would be comfortable teaching courses in any of those areas, as well as more specialized advanced courses such as Evolutionary Genetics.

One thing I've learned while teaching is the extent to which effective teaching is supported by the instructor having an understanding of how students learn and developing a library of techniques to use. I engage in continuous self-reflective teaching practices, which include keeping a journal and asking students for frequent, short-form feedback. I incorporate feedback from student evaluations, both working to improve on topics that students have identified as weaknesses and to build on strengths. As both a visiting assistant professor and a graduate student, I have actively sought out opportunities to develop as a teacher; these have included participating in teaching workshops at Knox College and St Mary's College, and courses through the Duke Certificate in College Teaching, mentoring and professional development through the Preparing Future Faculty program, and receiving the Bass Instructional Fellowship to design and teach my own course while a PhD candidate.