M. Fork Statement of Teaching Philosophy and Goals

As a scientist, I strive to understand how the world works by critically examining data and when appropriate, incorporating those data into my existing conceptual model. I hope to teach both undergraduate and graduate students how to do the same thing. Whether students enroll in one of my courses because of a deep interest in the subject or simply to fill a requirement, I teach in a way that both aids their understanding the subject matter and catalyzes **learning and practice of skills that are useful in and beyond the discipline**. My goals are for students in my classes, each week, to: 1) critically evaluate information or ideas and 2) connect new information to existing knowledge to better understand how the ecosystems around them work. It is crucial to make this sort of learning available to all students, whether or not they choose to pursue a career in science.

While I think it is important for students to learn the facts and concepts that underlie scientific understanding, I want students to learn them while they **think critically about and apply these concepts**. As part of Duke's Certificate in College Teaching, I designed an activity that asks students to evaluate the scientific information they consume on a day-to-day basis. Students compare a popular science news story to the original journal article on which it reports, and write an essay in which they analyze the accuracy, tone, and conclusions of the scientific reporting. It is my hope that such practice of critical evaluation helps students as they take in and digest information of all kinds.

I also think it is important that **students place newly learned concepts and facts into the scaffold of their existing knowledge** and I design lessons to help them to do so. In a peer-reviewed teaching activity I co-authored (Ficken, Fork, and Fuller 2015) undergraduate students learn and apply basic tenets of landscape ecology. Before coming to class, students read that water availability increases with altitude in the Sierra Nevada Mountains, resulting in a vegetation pattern in which drought-tolerant plants dominate at low altitudes and more cold-tolerant plants are found higher on the mountains. In class, we present students with a new landscape: the Florida Scrub, where topographic relief is orders of magnitude smaller and where lower altitudes that are closer to the water table experience wetter conditions while higher altitudes have well-drained, dry soils. Students use this information to predict where drought-tolerant and -intolerant plants would sort along this micro-elevation gradient, applying the concept they learned earlier to a new landscape. Students who think carefully will realize that in the Florida Scrub, the vegetation pattern is the opposite of the Sierra Nevada and will assign the drought tolerant plants to the well-drained and dry higher elevations. Students apply and deepen their knowledge of ecological concepts by applying them to new ecosystems and situations and confronting them with new information.

I believe in treating college students as the adults they are, and in my classes I expect them to take responsibility for and an active role in their own learning. **I encourage students to set their own goals and to try unfamiliar methods and concepts**. For this learning environment to be effective, I let students know that they have to engage and take the risk of trying even if they don't know the outcome in advance. Indeed, in conducting scientific research, we are never certain in advance about the outcome of an experiment. As they learn to take these risks, I provide students an environment in which it is safe to make mistakes by offering guidance and ungraded formative feedback. As a TA for Stream Ecology, I advised students as they completed semester-long projects. Small groups of students conducted an ecological risk assessment for the construction of a hypothetical coal ash facility near a

river. The students determined the roles they would play on their team and the subtasks they had to complete. Because of the small class size in this upper level course, I was able to meet with each group multiple times to guide them on the appropriate scope and approach, but required them to come to these meetings with specific questions or research plans for critique. Because their plans were ungraded at this point, they had freedom to explore the idea and suggest unfamiliar approaches without the consequence of poor grades for misunderstanding.

In addition to teaching introductory biology and ecology courses, I would be prepared to develop **new courses that focus on ecology at the ecosystem level of organization** and on human-natural system interactions. For example, I would look forward to developing courses in ecosystem ecology and urban ecology. I would also enjoy developing a field skills course in which students could learn and practice field ecology methods while applying and reinforcing their knowledge of ecological concepts. I will give students hands-on research experiences by incorporating fieldwork into my curriculum and teaching students to work with the growing body of environmental data that is available online. I would also hope to work collaboratively with faculty from other departments to develop **interdisciplinary courses** that examine a theme (e.g. water or energy) from the viewpoint of a variety of disciplines (e.g. science, policy, and economics). Beyond generating new connections among disparate concepts, such a course would provide an opportunity for students to work on teams and to practice communicate and collaborate with colleagues who don't share the specialized vocabulary of their major.

As an educator, I also look forward to creating **educational opportunities outside the classroom**. I look forward to mentoring students as they complete independent ecological research and involving students as technicians and collaborators in my own research studying urban and aquatic ecosystems. I would look forward to working with the local chapter of the ESA SEEDS program to recruit and retain a diverse group of young ecologists, and to expand the research opportunities available to our students.

I work to iteratively improve my teaching by reacting to students' needs and understanding. Taking an approach from environmental management, I try to think of my teaching with a strategy of "adaptive management." I evaluate progress toward learning objectives after each class by asking students to relay one thing they've learned and one question they have on an anonymous notecard; this serves as an informal assessment tool that allows me to adjust the material I teach and compels students to reflect and internalize their own learning.