Erin Mordecai Teaching Statement

Teaching philosophy

My main goals in teaching are to promote critical thinking and problem solving and to engage students in an active learning environment that empowers students to master the course material.

To encourage critical thinking, I take a problem-based approach to teaching, using applied questions to motivate the teaching of more abstract concepts and theory. For example, I could use a question about which conservation strategies would best protect a declining tree species to teach matrix population models. While mastery of the foundational concepts in ecology—population growth, competition, consumer-resource interactions, etc.—is critical, it is also important for students to think about competing hypotheses, interacting mechanisms, and variability that occur in the real world. To emphasize both conceptual rigor and real-world application, I incorporate primary literature into teaching. This encourages students not just to grasp the main results, but also to understand the complexities of experimental design, uncertainty in results, mechanisms, and broader implications of research. Complementing this approach, where possible my graded exercises emphasize communicating scientific results and synthesizing findings. A particular discussion area of interest for me is asking students to compare science communication in the primary literature versus in the news and popular media.

Although sometimes challenging in larger courses, I strive to maintain an active learning environment for students. This involves breaking the class into discussion groups, organizing debates in which students take different perspectives on contentious environmental issues, using clickers to poll students during class, and incorporating laboratory and field exercises as much as possible. In particular, I use computer simulations to teach key ecological theory in a more hands-on way, by providing pre-coded exercises that students can run and manipulate themselves. I also enjoy, where possible, using field trips to local areas of interest to teach ecological sampling methods and experimental design. Finally, class blogs are particularly engaging for students, encouraging them to connect current events and their daily lives with relevant topics in ecology. For example, as a teaching assistant for a disease ecology course, I contributed to the blog (http://eemb40.blogspot.com/), where we posted a variety of content about infectious disease, including news stories, songs, and pop culture references, as well as lecture slides and other course materials.

I am qualified to teach courses in introductory ecology, population and community ecology, field plant ecology, ecological theory and modeling, and disease ecology. Below, I outline specific courses I would be interested in teaching at Stanford.

Introductory courses

Introduction to ecology. Conceptual coherence and real-world examples would be my two focal points for this course. I would use empirical problems or findings to motivate each concept, and introduce the underlying theory to achieve a broader context for each topic. Specific topics would include population growth and regulation, consumer-resource interactions, competition and coexistence, food webs, ecosystem impacts of biodiversity, and the consequences of climate change at the population, community, and ecosystem levels.

Advanced courses

Community ecology. In this course, I would cover population growth, competition, consumer-resource interactions, coexistence, biogeographical patterns of species diversity, and food webs. I would emphasize the well-developed theory underlying these concepts, but also provide empirical context using examples from the literature. Finally, I would link this foundation to new research and debates in community ecology, including theories of coexistence based on neutrality versus niche and fitness differences, the relationship between diversity and ecosystem function, and the role of climate change in altering communities.

Plant field ecology. While at UCSB I served as a teaching assistant twice for Jonathan Levine's plant field ecology course. In my experience as an undergraduate and as a TA, there is no better avenue for students to learn and become passionate about ecology than through field education. I would enjoy teaching a plant field ecology course at Stanford. The course would consist of weekly field trips to different plant ecosystems in Northern and Central California, such as grassland, coastal sage scrub, chaparral, riparian forest, redwood forest, and salt marsh ecosystems, supplemented with a weekly lecture. I would design each field trip around an experiment or set of observations focused on answering an ecological question. For example, as the teaching assistant for the UCSB course, I designed a field trip to Carpinteria Salt Marsh Reserve in which students measured the influence of abiotic and biotic factors on salt marsh plant zonation, focusing on the role of the parasitic plant *Cuscuta salina*.

Disease ecology. As a teaching assistant for a course in disease ecology for non-majors, I discovered that students find diseases and parasites inherently fascinating. Disease ecology is a natural point of entry into the study of ecology because it concerns everyday life; in fact, several of my previous disease ecology students changed their majors to ecology following the course. I would like to design a course at Stanford covering diseases of humans, plants, and wildlife, using each disease as a way to introduce topics in disease ecology and epidemiology. This course would also provide a unique opportunity to teach the applications of mathematical models, e.g. for understanding the timing and severity of outbreaks, predicting disease dynamics, and informing public health and vaccination strategies.

Graduate seminars

Ecology at the theoretical-empirical interface. This course would teach practical applications of modeling for empirical ecologists. It would focus on methods for parameterizing mechanistic models, such as population growth models, using field data. I would lead model analyses in R, providing code that the students could use in their own research. Specific topics would depend on student interest, but could include generalized linear models and mixed models, maximum likelihood fitting for mechanistic models, trajectory matching for dynamic models, and Bayesian model fitting using MCMC.

Conservation and disease. This seminar would focus on emerging disease and global change, and their impacts on species and ecosystems of conservation interest. Topics could include amphibian declines and the chytrid fungus, ecosystem consequences of Sudden Oak Death, and pathogen spillover from exotic to native species.