Teaching Philosophy

My teaching philosophy comes out of my experience as a student at William & Mary, a liberal arts college, and has been subsequently refined by teaching and research appointments. My experience learning from outstanding faculty at William & Mary had a major impact on my career and has left an indelible impression regarding the importance and challenge of quality pedagogy. I gained experience as a teaching assistant in undergraduate ecology and evolution classes at Indiana University, which included leading discussion sections and giving lectures to hundreds of students. I will teach courses that emphasize:

The process of discovery, or how we know we what we know: While a basic set of facts and methods are indispensable, my classes will emphasize the way in which we know. I will challenge students to design their own experiments to test novel hypotheses and critically evaluate their credence in propositions with different levels of empirical support.

Numeracy and the importance of simple mathematical models: The economist Paul Krugman has said "[T]here are also important ideas that are crystal clear if you can stand algebra, and very difficult to grasp if you can't." Yet many students graduate from university effectively innumerate and hence unable to grasp many important scientific concepts. I will promote numeracy by including simple mathematical models and data analysis modules into my instruction.

How science enriches the experience of everyday life: The power and wonder of science is that it provides real explanations for commonplace observations. Here, I can bring my own research on leaf evolution into the classroom by developing teaching modules on the ecology, evolution, and physiology of easily observable diversity in leaf form.

Potential to Expand Quantitative Pedagogy

My broad training within and beyond academia has given me the tools to teach a wide range of fundamental and applied biology courses with a quantitative focus. I could contribute to teaching a range of existing Botany courses including:

BOT 110: Biodiversity	BOT 201: Plant Evolutionary Diversity
BOT 420: Functional Form of Plants	BOT 455: Analysis of Biological Data
BOT 462: Plant Evolution	BOT 660: Ecological Statistics with R

Additionally, I could lead lecture and/or field courses in plant ecophysiology. I would also love to spearhead departmental efforts to expand the quantitative curriculum. I want to emphasize the role of theory in biology, make math and statistics accessible, and impart practical data skills for diverse scientific careers. Potential undergraduate courses I am interested in developing are:

Mathematical Biology - a survey of essential mathematical tools for analyzing biological models using Otto and Day's *A Biologist's Guide Mathematical Modeling in Ecology and Evolution*. Ideally, I would combine lectures with a lab using Mathematica or SageMath to give students hands-on experience.

Phylogenetic Comparative Biology - comparative biology has been revolutionized by methods using phylogenetic trees to infer evolutionary processes. How has 'tree-thinking' changed the way we learn about nature? I will actively engage students using assignments that analyze real data on phylogenetic trees with R packages.

Statistical Rethinking - based on McElreath's *Statistical Rethinking* textbook, this advanced biostatistics course will challenge existing statistical thinking and teach Bayesian data analysis using R and Stan, a powerful new language for probabilistic computing.

Data Science Toolkit for Botanists - a practical guide to programmatically collecting, wrangling, analyzing, visualizing, and reporting data with special emphasis on agricultural, biotech, and environmental applications relevant to botanists.

Graduate courses:

Demystifying Famous Equations - detailed derivations of some classic theoretical results in ecology and evolution to really understand where they come from and what they mean.

Reproducible Science Toolkit - tools and best practices to design reproducible workflows using RStudio and online repositories such as GitHub. We will also discuss the wider "reproducibility crisis" in science and arm students with tools to avoid common pitfalls that lead to false discoveries.

Mentorship Philosophy

I expect PhD students in my lab to identify an important unsolved problem at the intersection of evolution, ecology, and plant physiology. To guide them, I would provide a list of potential dissertation ideas when they first arrive so that we can begin to develop an Individualized Mentoring Plan. During the first year, the student and I would collaborate on a literature review, meta-analysis, or mathematical model based around one of the projects outlined on my list, or on a different topic we choose together. Ideally, this would result in a first chapter of their dissertation, identify key gaps in our knowledge that would be addressed during the remainder of their PhD work, and indicate whether the student should work on an existing system in my lab or develop a new system better suited to their interests.

As a departmental postdoctoral researcher at the University of British Columbia I took the initiative to organize graduate mentorship activities including an internal seminar series on biodiversity research, journal discussion groups, and a regional student-focused conference. I will continue to be an active and engaged colleague that fosters opportunities to promote graduate education and research. At a departmental level, I would also like to help develop an "externship" program to give students marketable skills and contacts with industry, nonprofit, and/or government partners. The vast majority students will not pursue careers in academia, but there is often little training for finding jobs that fully utilize their scientific skills. I know how to successfully translate academic training into marketable skills that will help students find rewarding and exciting careers.