**Kiya Riverman**

Teaching Statement

Teaching Philosophy:

Adapting to the long-term effects of predicted climate change is a growing challenge facing humanity. I am motivated to teach earth science because I believe that students are best equipped to address these challenges through a strong background in physical science. My primary goal as an earth science educator is to foster growth of my students’ intuition of earth systems processes, and to develop their ability to study those systems through scientific inquiry, such that they are posed to address the challenges of a rapidly-changing climate. My teaching pedagogy revolves around two major principles: an emphasis on scale of processes and data interpretation-focused learning. I have developed these principles through coursework in my Graduate Teaching Certificate, in the classroom as an Instructor at Penn State, and as faculty and a research mentor on the Juneau Icefield Research Program.

The most effective teachers in any subject are those who can convey enthusiasm for subject matter by contextualizing knowledge: why does this topic matter and how do new ideas tie to students pre-existing knowledge base. As an Earth Science educator, I am afforded a unique opportunity in this regard: students have a pre-existing relationship with the subject matter, by virtue of being citizens of planet earth. Students’ experiences in the natural world can provide a strong foundation upon which to build more quantitative understandings of earth processes. While teaching in a classroom in rural Oregon, this means teaching students that the rich soil that their families farm on was transported to its current location by the glacial outburst Missoula floods. I connect what they have observed on the farm to an otherwise foreign concept of ice-dammed lakes and joklhlaups, putting a scale on an otherwise tricky-to-imagine subject. With the Juneau Icefield Research Program, a field course I have been teaching and on for the last three summers, I incorporate this philosophy by relating all lecture content back to features the students can see in the landscape we are traveling over.

In the classroom I prioritize teaching through data interpretation-focused learning as opposed to memorization. Scientists’ understanding of the physical world is continually evolving, and this can provide an immense challenge to an earth science educator; what we teach is an actively growing and changing field. We do our students a disservice when we teach them only our current understanding of earth as canon. Instead, I prefer to present students with real data and guide them through interpretation of the system. In this way, students learn both the underlying earth process, but also how to think like a scientist. This approach can be accomplished both in a lab-course setting and a lecture-based course. In a lecture on seasonal evolution of subglacial hydrology on mountain glaciers, I like to show students ice velocity, air temperature, and dye trace data from the spring-summer time period. I ask them to make interpretations of the data in small groups, which then get shared with the wider group. We next discuss how the original authors interpreted the data, and any controversy surrounding that interpretation. In this way, students learn science as a technique for discovery rather than a series of unchanging facts.

I prefer to measure student learning using frequent but short concept-based quizzes to evaluate daily learning, and larger term papers that require synthesis of concepts studied in class. Frequent check-ins with regular quizzes require students to keep up to date with required reading and concepts discussed in class, as opposed to letting learning slide until a frantic period before a large exam. I measure my own success in the classroom based on the number and enthusiasm of student questions. My supervisors have measured my success in the classroom with student evaluations, where I have scored overall Outstanding (62%) and Very Effective (31%) with my students. In anonymous evaluations, students have further described my teaching as “brilliant and enthusiastic”, “wonderful and talented (teacher), sharing (her) enthusiasm... with the students”.

Mentorship Philosophy:

Mentoring of research students is a key component to building future generations of polar scientists. Some of the most rewarding aspects of my career so far have been the numerous opportunities to mentor students: from highschoolers on a field course to younger graduate students in the lab. Under my mentorship, six students have gone on to produce undergraduate theses and capstone projects, resulting in three posters at international scientific conferences.

My specific mentorship philosophy however revolves around four major principles: guided independence, fostered collaboration, flexibility, and an expectation of service. Students should be guided towards tangible research frontiers, but then allowed to form their own specific testable questions. I offer resources for support in pursuing those questions, including collaborators within the institution and abroad. When students begin to develop interests outside of my realm of expertise, I encourage them to follow their interests: discoveries occur when individual interests are followed. Finally, I expect my students to be engaged in service to their community through outreach, and to share their results with the wider scientific community.

My current student Isabel Suhr provides an example of my mentoring technique. Isabel, an undergraduate at Lewis and Clark College, was a student in my 2015 glaciology course in Alaska. As part of the course, the students derived and coded a glacier flow line model. I suggested that it would be interesting to use the model to learn more about the glacier bed elevation in poorly constrained areas. Isabel began researching model inversion techniques, and suggested using a Monte-Carlo technique, for which I have little implementation experience. I found a Computer Science professor at her university with experience in the technique, and we are now co-advising Isabel in her ongoing work. She found that the velocity data collected in the field was too low of resolution, so I brought another colleague on board to the project who has expertise in deriving ice velocity from remote sensing. Isabel will be presenting the results of her project at the American Geophysical Union’s Fall Meeting this year, and has begun drafting a manuscript for the Journal of Glaciology detailing our improved bed elevation profile for the Taku glacier. She also gave a public talk at the Mendenhall Visitor Interpretive Center as a thank-you to the Juneau community for supporting our work on their Icefield.

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Realistically, few of my students will become scientists themselves. However, by teaching and mentoring with an emphasis on data interpretation, independent exploration, and the scale of observed processes, I know that they will all enter the voting populous as informed earth scientists, able to think critically about the earth system and man’s impact upon it.