

## **Teaching Interests**

My general sense is that learning is maximized when students are actively involved in the direction of their learning. For this reason, I am strongly intrigued by so called “inverted classroom” approaches, in which students are assigned instructional materials (either in the form of reading or pre-recorded lectures) to tackle outside of the classroom, and in-class time is repurposed for hands on exercises or projects that more closely resemble traditional homework. Because these exercises are completed in class with instructors present, students are able to take a much more active role in their learning, but can ask for help when they get stuck.

This approach aligns with my observations from my own teaching experience that I as an instructor am most useful when responding to student questions and misconceptions (e.g. either during office hour sessions or when students stop a lecture to ask questions), rather than acting as a delivery vessel for general course content, and it also would allow me to spend in class time on activities that are more enjoyable for me (i.e. interacting directly with students), as opposed to lecturing.

I am also intrigued by “mastery learning” approaches (most easily implemented within an inverted classroom approach), where students are asked to master a given concept (by completing a short assessment of some kind) before moving on to the next, and each concept builds on the previously mastered one. Students are then graded based on how much of the material they are able to master by the end of the course. The difficulty here is that different students will move at different paces, and it can be challenging as an instructor to accommodate the needs of students who may at any point during the course be working on very different parts of the material (and the inverted classroom approach is already challenging because of the necessary up-front investment in creating the pre-recorded lectures and in class exercises). Nonetheless, it has always seemed perverse to me that we ask students who perform poorly on assessments to move on and attempt to learn new material which often builds on the material they’ve not yet understood, and then mark them poorly again for not understanding this new material. It would therefore be my aim to implement “inverted classroom,” and eventually “mastery learning” approaches in the courses I teach. However, I also want to note that doing so is notoriously challenging, and so hybrid approaches which do not completely eliminate but rather reduce traditional lectures may be an option, especially early during the course design process (class size would be another factor, as these approaches are more difficult to implement in larger classes).

With respect to the specific courses I would be interested in teaching: at the undergraduate level I could teach introductory courses in evolutionary biology, genetics and human genetics. At the advanced undergraduate or and graduate level I could teach courses in population, evolutionary, statistical, and/or quantitative genetics. Issues at the intersection of ancestry/race, genetics/genomics, human evolution and complex disease are not generally well understood by the public and are likely to take a more visible role in our societies going forward. My courses would aim to make sure students are well equipped to evaluate these issues as their lives outside of the university. To this end, I would be interested in teaching a course explicitly about the relationship between race, ancestry and genetics, and such a course could be designed either as an elective course for non-majors, or at the upper level students majoring in biology.

A major focus of my undergraduate teaching would be to introduce students to basic programming (e.g. in R or python) and mathematical modeling as a means to solving biological problems. These skills will only become more important in the biological sciences moving forward. At the graduate level I expect that these skills will be central to any course that I teach.

Finally, with respect to mentoring students and post-docs, my philosophy is motivated largely by my own experiences. I entered graduate school with little to no background in programming and mathematical modeling, and there is simply no way I could have been successful except for the fact that the environment in my PhD lab made it easy for me to say “I don’t understand this, can we work through it again?”. It would be my aim to create such an environment for my students as well. For post-docs, my aim would be to act mostly as a facilitator for their independent research. As a post-doc myself, I’ve enjoyed taking an extremely informal mentorship role interacting with graduate students in the lab, and I would encourage post-docs in my lab to do the same. Finally, as a post-doc at Columbia I have been mentoring an undergraduate student in the lab, and my lab would aim to involve a small number of undergraduate students who would be mentored either directly by myself, or by post-docs or graduate students who were interesting in taking on the additional responsibility.