Teaching Statement

Throughout my professional career, excellent courses and lectures given by outstanding teachers and professors have driven my enthusiasm for plant genomics and genetics. It is my teaching philosophy to impart my passion for learning to students in any class I have privilege to teach, and to help them stimulate the ability of critical thinking. My teaching skills derived from my learning and mentoring experiences at Iowa State University and UC Davis. I have mentored two REU (Research Experiences for Undergraduates, an NSF supported program aimed at helping undergraduates to gain research experiences) participants and worked with them on different projects. I have also mentored honor program participants (first year college students interested in exposing themselves to academic environments). I have mentored and worked closely with two undergraduate lab assistants as well as three visiting scholars. I have additionally given lectures on introducing QTL mapping for a group of undergraduate students at Truman State University and on RNA-seq analysis for a graduate class at UC Davis.

With the experiences of interacting with students from various backgrounds and with different interests, I believe the most efficient way of learning is to enable students to engage with the subjects themselves. For example, one of my REU participants wanted to gain coding experiences by working with genomic data. Since he already had some research experience, we structured a project-based mentoring plan for him instead of walking through a textbook of coding. During that summer, we met several times a week to discuss the project, looked up books and research literature to solve the problems encountered, and communicated on our coding scripts and research progresses. He finished the project very well and received an REU award. Most importantly, he gained an enthusiasm for genomic research and entered the graduate school.

In my mind, course materials and engagement are the two most critical components for a successful class in teaching genomics/genetics or biology. Thus the chief goals of my teaching are to develop class-specific teaching materials and to encourage the students to take active roles in the learning process. I will use different approaches to engender participation according to different circumstances. For lower-level courses, I will explain basic concepts with interesting examples. I will also try to use dynamic graphics to visualize ideas. For complex concepts, I will suggest that the class think something over by pausing the lecture and asking questions after giving them a period to think. For higher-level courses, project-based learning and hands-on experience on data analysis may be the most efficient. I would like to bring in real research data to contextualize concepts

and use my own path to guide the students through the course materials. For example, to teach the concepts of association mapping, I would suggest that students download raw data from a classic paper (e.g. nested association mapping experiments) and encourage them to think through the experimental design and any potential problems and interpretations of the results. In addition, readings and discussion outside of the class can be very helpful, and I will lead a reading group to discuss classical ideas or recent advances in an area.

Computational and quantitative skills are increasingly important in genetics, genomics, plant breeding and biology in general. My research and learning processes have benefited a lot from lab discussions across multiple disciplines, including statistical and computational consultations from experts. With the availability of enormous amounts of genomic data, the interpretation of biological phenomena will largely rely on data analysis skills. To realize this, in-depth understanding of the mathematical or statistical theory is critical. I am keen to develop courses on the use of statistical modeling and programming, as applied in genetics, genomics and plant breeding. I will highlight the importance of data skills in every level of my classes.

I am capable of teaching three levels of courses in biology/genetics/plant breeding. At the introductory level, I can introduce basic principles of genetics. At the under graduate level, I can teach programming skills for genetics and genomics. And at the advanced level, quantitative genetics is my area of expertise. In each level of my classes, I will try to demonstrate how to use statistical and computational tools to understand biological principles and phenomena. To make the classes more interesting, I will develop programs using R or python, to visualize, simulate or demonstrate biological principles. I will encourage students to write code collaboratively, i.e. via Github. Students's code will be peer reviewed by other students to gin experience reading/evaluating others' code and ensure code is written and documented well. If possible, we will pack the codes/algorithms into packages and share with the community.

Finally, I see strong connections between research and teaching. My research enlightens my teaching and my teaching helps me broaden my understanding of research. I welcome further opportunities to bring my passion for and knowledge of quantitative genetics and genomics to the classroom. And I hope I will be able to make contributions to my students' intellectual lives.