Section 2: Teaching Philosophy

What attracts me most about the scientific career is the excitement of new discoveries and getting to the mechanisms of biological processes. But even more satisfying is the opportunity of sharing the experience with others, bringing together the excitement of old and new scientific discoveries. This is the very reason that I love teaching and enjoy being a professor. My formal teaching experience started when I was an undergraduate student. I did a three-month teaching practice at a high school in China and was awarded an excellent teaching award. That was the first time I felt so proud of being a teacher. Ever since, I have taken every opportunity to be involved in teaching. Since joining UF, I have had opportunities of teaching a variety of courses at different levels, including General Biology at lower undergraduate level, Plant Physiology and Molecular Biology at upper undergraduate level, and graduate level courses including Genomics and Bioinformatics, Plant Physiology, and Proteomics, in addition to workshops and lectures to students, teachers, faculty and staff. My philosophy of teaching is grounded in the following beliefs. First, a good learning environment is important; Second, students excel when they become active learners; Third, developing critical thinking and reasoning skills is essential.

A good learning atmosphere. I strive to create and maintain a good learning environment in all my classes. Teaching should be a two-way process, i.e., close teacher-student interaction. In this process, a teacher’s positive and enthusiastic attitude is very important for developing a good learning atmosphere. I encourage students to constantly give me feedback on teaching material, speed, difficulty, my accent and effectiveness etc. I know that students are often afraid or reluctant to give feedback, especially criticisms. So I tell them teaching is an art and I have strong desire to keep improving my teaching skills, just as I want to learn perfect English from them. I also tell them my tough life journey and it is not easy to achieve high standard, but it is extremely satisfying after you have put your best effort. I want my students to know that I care for them, and I want to help in their journey towards success. They should ask me as many questions as possible and I am willing to spend as much time as possible to help them out. I always tell my students two sayings, one is “water flows from high to low, humans go from low to high”, and the other is “America believes hard work, prepare yourself for opportunities”. My students get a feeling of my passion for teaching, my care and respect for them. For example, I always want to know their names and hometown. I was able to remember the name of each of my 140 students in my BSC2007 class. Several months after my teaching, I met a student from that class on campus and I was able to call his name. He was shocked that I still remember his name. Occasionally, students may ask a difficult question, I tell them that it is a great question that reveals my weakness. Later, I always get back to them with a good answer after consulting my colleagues or other resources. So students know that I am not perfect, but I respect and care. Such a friendly interactive atmosphere is conducive to fruitful learning.

Active learning and understanding. I believe learning should be fun and students should be active, not passive in knowledge acquisition. Teachers used to view teaching as just lecturing, putting students into a passive role. Students often lose interest and creativity in learning. Therefore, I strive to make learning an active and enjoyable experience. First, I go out of my way to make the topic exciting and entertaining. My undergraduate teaching assignment is often related to plants. The majority of students in my class intend to apply to medical or dental schools and they think plants are not interesting. On one hand, I ask them what plants do and discuss many problems that humans are facing, e.g., global warming, environmental challenges, crop yield, energy crisis, human nutrition and diseases etc. Plant biologists can help solving the
problems and save our world. On the other hand, I tell examples of “Plants are humans”. Plants can sense different color of light, plants produce human neurotransmitter to guide pollen tubes towards the egg cell, plants can respond to touch and “dance” through thigmotropism. Students realize that plants are important and amazing. Second, I constantly get students’ attention and engage them. Research has shown that many students can only stay focused in the beginning few minutes of a lecture. So I often ask a lot of questions or ask students to present questions and encourage discussion. In a large class, this requires considerable innovation. One way is to let students do small group exercises, and then turn in their answers using the new “clicker” technology. It is an effective pedagogical technique to let everyone participate and share knowledge. In addition, sometimes I intentionally make mistakes during my lecture, and ask students to catch my mistakes and provide correct answers. The most effective way in my experience is to tell real-life stories and play very interesting movies related to the topics. My students love the movies and told me that the materials not only helped understanding, but also keep them focused. Third, I place a large emphasis on understanding the knowledge. Students tend to focus on memorizing facts and terms. However, memorized knowledge does not often last long in the brain. Understanding and applying the knowledge are important for success in class as well as out of class. I try to structure my lectures so that students can see the “forest” as well as individual “trees”. Biological processes are inherently connected. I often ask students to compare and contrast different topics and concepts, and make correlations. I also try to design questions and tests that focus on understanding and application of the knowledge.

**Critical thinking and reasoning skills.** I strive to infuse inquiry-based learning into my curricula so that students are able to develop critical thinking and problem solving skills. For example, I have incorporated proteomics concept and techniques into a Plant Physiology course. Three lab sessions were designed in connection with photosynthesis lectures. In the first lab, students extract proteins from a C3 plant (wheat) and a C4 plant (maize), and separate proteins SDS gels. In the second lab, students excise differential expressed proteins and digest the proteins. In the third lab, students learn how acquire protein fingerprints on a mass spectrometer, and then identify the proteins of interest using “FBI fingerprint” database. I have created an online tool for teaching proteomics ([http://www.moleculardetective.org](http://www.moleculardetective.org)). At the beginning of each lab, students are asked to think creatively ways to solve biological and/or technical problems. At the end the lab, they need to analyze the results critically, e.g., how to explain the discrepancy between experimental and theoretical molecular weights, how to interpret relative abundance and functional properties of the identified proteins, and how to put the results in the context of C3 and C4 photosynthesis. In another course, when we learn biotechnology and genetic modified organisms, I tell my own experience in Europe, where Greenpeace people burned our greenhouse containing transgenic plants. My students have learned the knowledge of natural evolution, agricultural breeding and genetic engineering. I then present different views from scientists, the general public and the Greenpeace people. I ask students to come up with their own conclusions and vision based on their knowledge and reasoning skills. Such inquiry-based learning will not only help students develop scientific reasoning capability, but also train them problem solving skills that are important to their daily lives and future career.

Teaching provides an excellent opportunity not only to transmit knowledge and enthusiasm to our next generation but also to influence personality development through enhancing reasoning and problem solving skills. I have greatly enjoyed teaching. I believe teaching is an art and can always be improved. It is this constant pursuit for the beauty and perfection in teaching makes it both exciting and rewarding as teaching has always been for me.