

Personal Statement of Teaching for Mark S. Sherriff

As a teaching-track general faculty member, my main focus in my career has been undergraduate education. During my time at UVA, I have taught over seventy course sections, facilitated over 100 lab sections, managed around 250 teaching assistants, and taught over 5500 students. I thoroughly enjoy the challenge of teaching and am looking forward to many more exciting and productive years as a professor.

Teaching Philosophy and Methodology

My goal is to create learning experiences that engage the student both in and out of the classroom. Students should come to class, learn something new, work with their classmates to form a better picture of the concept in their mind, and then find places in their life where the ideas are real and apparent. I have found that in the field of computer science, even the most abstract theory can be made more concrete via real world examples and analogies.

In the years that I have been teaching at the University of Virginia, I have followed my methodology of real world examples, active learning, and project-based learning. From my 500-student introductory course to my relatively smaller 80-student upper level electives, I endeavor to make each class a unique learning experience, whether that means bringing in props to illustrate a point or creating a scavenger hunt that sends students all around grounds. I believe that any class that is stagnant in its presentation and involvement with students is missing a huge opportunity to engage and challenge students and to recruit them into computer science. Being able to create these experiences for new engineers is even more special, as I cherish every time a student tells me that they declared computer science as their major because of my class.

I follow the model of “Inform, Experience, Implement” in my teaching. This cyclical pattern first establishes the history or interest of a topic to ground it for the student in real life. Then I move into an activity where the student can experience how the problem or technology affects them. Finally, we transition the problem into computer science, teaching the algorithms and techniques used to solve the problem. I have used this model with middle and high school students and all levels at UVA with great success.

Probably my greatest accomplishment in teaching with this philosophy is with CS 1110. For seven years, I was the primary instructor and course coordinator for the largest course in the School of Engineering and Applied Science. When I started teaching the course, the fall semester offering had around 130 students total. Now, well over 1000 students take the course each academic year. Regardless of the size increase, I focused on making lecture engaging and worthwhile. Routinely I received feedback from students that my class was always worth coming to because it was different than the other classes they had. That is probably one of the greatest compliments I could get from first year college students. To this day, I am stopped around town by students who start with “I was in your CS 1110 class.”

Teaching Evaluations and Accolades

I have received teaching awards at multiple levels – department, school, university, and nationally. In 2016, I was awarded the IEEE Computer Society Computer Science and Engineering Teaching Award, an international teaching recognition given by one of the two main professional organizations in computer science. The citation with the award was “for outstanding contributions to undergraduate computer science education through innovative teaching and commitment to increasing enrollment and diversity in computer science programs.” Videos of my acceptance speech and an interview with the IEEE can be found on my website.

At UVA, I have received numerous teaching award. Across the university, I won the All-University Teaching Award in 2014, which recognizes outstanding teaching in all of UVA’s schools. Within SEAS, I was awarded the first-ever Hartfield-Jefferson Scholars Teaching Prize. My nomination for this award came from both faculty and students. I have also been recognized by student organizations, having been named the Trigon Engineering Honor Society’s faculty award and the ACM CS Professor of the Year twice.

During my years at UVA, both my students and my colleagues have recognized me as an effective teacher in SEAS. My overall teaching evaluation scores are around 4.5/5.0 across all of my courses. I consistently beat the SEAS average in every teaching evaluation category. While teaching CS 1110, I taught more student credit hours than any other professor in SEAS over the same time period and ranked in the top 10 for all of UVA. Students report in my evaluations that I create a classroom experiences that students from both SEAS and the College enjoy and recommend to others. They also report that they learn a great deal from my class and many are motivated to continue their education in CS. It is always a wonderful feeling to be told that you helped someone find their academic passion in college. I am extremely proud of my teaching record at UVA.

Teaching Innovations and Course Creation

Using my methodology of “Inform, Experience, Implement,” real-world examples, and active learning, I have created some unique classroom experiences that have been successful and have been recognized for being innovative. When I was teaching CS 2110, I introduced an activity called the Encryption Chase. The lesson began with me entering the room and informing the class that their lecture for the day was encrypted and that

they would have to figure out how to decrypt it in order to learn the material. It just so happens that the lesson that day was on various encryption methods. When students solved the first clue, it sent them to various other places around grounds to solve other clues. Each clue was encrypted with a different technique, forcing the students to learn as they went. Later, when I began teaching CS 1110, I adapted the Encryption Chase to teach looping constructs in Java. A basic Caesar cipher is simply a rotation of each character on a string. Students learned how to write loops while decrypting text I had hidden around grounds. The Encryption Chase was named one of the “Nifty Assignments” in CS in 2010 at the ACM SIGCSE conference.

Transitioning from my lower-division courses to the upper-division courses, I also incorporated new ideas into CS 3240 (Software Engineering). The first semester I taught the class marked the first time the department has used Lego Mindstorm NXT robots for the course projects. The Lego kits gave the students exposure to Bluetooth, basic mechanical engineering, TCP networking for communication, and physical data sensors (light, ultrasonic, touch, etc). While this project-based learning exercise is extremely important, I also focused on their role in the industrial workplace. All teams were required to give a formal and informal presentation to their classmates. The Lego kits were used for several years after, until technology moved on and we now build web-based systems. However, I strongly believe that forcing students to work with a piece of technology they are not accustomed to is useful. When I took over CS 3240 again, I added QR scanners and thermal receipt printers to a new project – creating a new voting system from the ground up.

Another innovation that has worked well is the pairing of teaching mobile technology with teaching web services. By themselves, each concept could be the main topic in a separate course. However, I felt that showing how low power devices and devices that could disconnect and reconnect from the network at any time provided unique challenges for web developers. The course would provide students with the skills they need to succeed in an Internet-connected, mobile-wielding world. Projects have spanned a wide range, from flash card apps for young students to apps that do optical character recognition to apps for sharing and trading old textbooks. The course eventually became CS 4720, Mobile Application Development, and is one of the most popular electives in the department every semester, with the waitlist often much longer than the actual enrollment of around 80 students. I have published my work on this course at the IEEE/ASEE FIE conference.

Dissemination and Self-Improvement

As my primary research area is the scholarship of teaching and learning in CS education, I have found that the dissemination of my teaching methods has intersected quite well with my research publications. Over the years, I have published papers in major CS education venues, such as the SIGCSE Symposium, the Conference on Software Engineering Education and Training, the IEEE/ASEE Frontiers in Education conference, and the ASEE Annual Conference, with an expected submission to ACM Transaction on Computing Education coming in late summer 2018. My publications detailed the specifics on my teaching methods, including information on how to teach mobile application development, how to create a curriculum for summer programming camps for younger students, and the creation of a service learning practicum capstone. Through the Designing Empirical Education Research Studies (DEERS) NSF-funded project, I have worked with dozens of instructors across the country on how to run empirical education studies in their own courses.

Beyond my research studies, one of my main vehicles for self-improvement and reflection comes from podcasting. I have podcasted every lecture from every class for the past decade. These recordings are incredibly valuable for revisiting my lectures and teaching style when I evolve a class from year to year. Along with my podcasting efforts for self-reflection, I have exercised other avenues to improve my teaching. I have both attended and run teaching workshops offered by the Center for Teaching Excellence at UVA.

Summary

I feel that one of my greatest assets is my talent to teach. I am proud of my teaching evaluation scores over the years at UVA and the four years prior at NC State, especially in categories such as my enthusiasm for teaching, my course effectiveness, and whether the student would recommend me to other students. I am fortunate to have been able to learn from exceptional instructors at Wake Forest, NC State, and UVA, and I have tried to incorporate their various teaching styles into my own. I strongly believe in the strengths of problem-based learning, especially in a field such as computer science. I continually try to involve the class in every activity via active learning techniques, as opposed to having a strictly lecture-based class.

The computer science field is becoming much more diverse, with new students of various backgrounds and age groups. People are turning to computer-related fields for opportunities to start their career in a growing area, jump-start their current career, or just out of curiosity. Some students will come in ready to learn, while others want to get in and out as fast as possible so they can move on with their careers. These different approaches, backgrounds, and motivations create an interesting environment in which to teach. I try to teach my classes to reach all of the students in my class, not just those who are there for reasons that are more in line with my thinking. Through my experiences as an instructor, teaching assistant, and through my academic work, I am confident that I am an effective instructor in the field of computer science.