

Personal Statement of Teaching for Mark S. Sherriff

As a teaching NTTF member, my main focus has certainly been undergraduate education. During my time at UVa, I have taught twenty-seven course sections, facilitated over forty lab sections, managed around 100 teaching assistants, and taught nearly 3000 students, totaling over 8000 student credit hours – the most of any SEAS faculty member over the same five year span. I thoroughly enjoy the challenge of teaching and am looking forward to the upcoming years at UVa.

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 five 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 70-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.

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. Today, Lego Mindstorm robots have been purchased based on the work that I did in CS 3240 for continued use in the course in the future.

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. In support of this program, I received a gift grant from Google for 29 Android devices and another gift of Google TV devices. Students built intricate projects that balanced features between Internet-facing web services and Android-powered apps. Projects have spanned a wide range, from flash card apps for young students to apps that do optical character recognition. Students have thoroughly enjoyed the class and it has now been officially added to the UVa Course Catalog as CS 4720: Web and Mobile Systems. I have published my work on this course at the IEEE/ASEE FIE conference.

Also in the realm of project-based courses is the other new course that I have helped to create with Prof. Aaron Bloomfield. In the Spring 2012 semester, we taught the first instance of the Service Learning Practicum course, which gives teams of students the opportunity to work with actual customers by helping to solve the software needs of non-profit organizations in Charlottesville and beyond. The students are learning valuable real-world lessons about software development while also providing a great service for worthy organizations. My team built a family

and home repair tracking system for Appalachia Service Project. The system went live in June 2012 and will be actively used across five states, aiding summer staff and volunteers with helping those in the greater Appalachia area.

Teaching Evaluations and Accolades

During my five years here, both my students and my colleagues have recognized me as an effective teacher in SEAS. My overall teaching evaluation scores are around 4.6/5.0 across all of my courses. I consistently beat the SEAS average in every teaching evaluation category. While doing this, I have taught more student credit hours than any other professor in SEAS over the same five year time period, and rank third in student credit hours for all of UVa for the Spring 2012 semester. My largest classes crest 484 students (CS 1110) and even my upper-level elective courses are routinely 70-80 students. 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.

For my efforts, I was awarded the first ever Hartfield-Jefferson Scholars Teaching Prize, worth \$12.5K. My nomination and selection came from both students and other faculty in SEAS. I have also been awarded the Trigon Engineering Society's faculty award and have been named the ACM CS Professor of the Year twice.

Teaching Self-Improvement

One of my main vehicles for self-improvement and reflection comes from podcasting. I have podcasted every lecture from every class for the past four years. 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 attended teaching workshops offered by the Teaching Resource Center at UVa (although these workshops tend to be geared more toward small liberal arts courses). I have been attending the SIGCSE conference and have also served on the organizing committee for the CSEET (Conference on Software Engineering Education and Training). I am staying active in the CS Education community and have published papers in various conferences, while also helping to run tutorials and educational sessions at these conferences.

One of my weaknesses that I need to work on is fatigue affecting how I respond to students. Some students have noted that "catching me at the wrong time" yields less than positive results. I do admit that with classes of over 400 students, answering the same question multiple times can be frustrating at best, maddening at worst. I have been looking in to ways to help balance the face-time load with my TAs through different types of office hour setups and also using various online tools. I believe these methods might aid me with this particular problem.

Teaching Conclusion

I feel that one of my greatest assets is my talent to teach. I am proud of my teaching evaluation scores over the past five 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.