Teaching Portfolio for Mark S. Sherriff

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More information and materials can be found at:
http://marksherriff.com

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 300 teaching assistants, and taught over 6000 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 IEEE interview 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.

Teaching Responsibilities

As academic general faculty, my primary teaching responsibilities revolve around teaching and managing large, lab-based undergraduate courses while also teaching large upper-level electives. While I have taught several different courses during my time at UVA, my most significant contributions in teaching have been:

- teaching and managing our main CS 1 course, CS 1110, every semester for seven years during a time of sustained growth;
- creating and teaching a new elective in mobile application development, which has become one of the most popular electives in our department; and,
- helping create several new programs, such as our TA training course and capstone course sequence.

I went into academia with a desire to be in the classroom, specifically wanting to create and deliver unique learning experiences. Teaching courses at different levels across various topics has given me ample opportunity to do just that.

In the category of large, lab-based courses, I have taught multiple sections of CS 1110 (Introduction to Programming), CS 2110 (Software Development Methods), and CS 3240 (Advanced Software Development Techniques). These classes work together to bring students with no programming background up to a level where they can create moderate-sized software systems. As my research and teaching background is firmly grounded in software engineering, I intentionally focus these courses around building software development skills and techniques.

In addition to teaching the intro courses, I typically teach one upper-level elective each term, usually with around 80 students enrolled and over 100 on the wait list. My primary elective areas are in mobile application development and video game design. These courses focus on software development in the real world and project-based learning. I want my students to have as much experience gathering requirements, creating software designs, and working together as a team as possible before entering the work force. I also give my project-based courses a great deal of flexibility in the nature of the system they build. Students are often more motivated when they have a vested interest in the system being created. I have seen a wide range of projects over the years, from TA application systems, to course scheduling aids, to flash card mobile apps for kids, to picture sharing websites. I am proud of the software my students have created as a part of my course.

In all my courses, I focus on active and example-based learning. My lectures are rarely typical lectures. I focus on small group exercises (even in classes over 250 students) where students break out with their neighbors to code a simple problem or design a particular algorithm. Sharing those designs and then arriving at a solution together is a core part of my typical classroom experience. I also try to get students moving as much as reasonably possible. One of my favorite activities is my scavenger hunt game that I use in as many classes as possible to get students out of the classroom itself to "discover" the lesson for the day.

My goal is to give students a reason to come to class. My classes are about engaging the students and working through problems together. I rarely (if ever) give straight lectures to classes. That's not effective for student learning nor is it what I find interesting and exciting about teaching. Programming is about problem solving. It's about learning about a need that someone has, figuring out how to meet that need, designing an algorithm around the solution, and then, finally, coding the final program. The program at the end is important, but that's just one piece of the puzzle! So, my classes focus on the interaction, the problem solving, and the algorithm design that is needed to be a good problem solver and programmer. And that is not done through lecture. That is done through working together on examples in an active environment.

Curriculum Development

Curriculum analysis and development has been another major focus in my career. From creating and delivering new courses, to establishing new degree requirements, to now helping redesign the entire CS curriculum, I feel that my leadership in this area has been an important contribution to the department and School of Engineering and Applied Science.

New Courses

The first new course I created is CS 4720: Web and Mobile Systems. The course came about when I was asked what special topics course I would like to teach in my early years at UVA. I have always enjoyed web application development, but I was already teaching some of that information in my databases course. I was then approached by a Microsoft representative about getting a class set of mobile phones for teaching a course that fall. That was when I decided to try to merge these potentially very different topics into a single course. The driving idea was that mobile devices are low-powered, always connected devices. So how do you go about doing complex things on them? You use web services, running on significantly more powerful hardware.

The course covered some basic web development, but then transitioned into the creation of web services, something that was not currently in our curriculum. The web services then are incorporated into mobile applications. Students published their web services for other students to use, thus forcing them to learn how to integrate unknown components.

The course quickly became one of the most popular electives in the department, maxing out enrollment almost immediately when registration opened and building a wait list that sometimes reached double the capacity of the course itself. With that sort of demand, it became obvious that the course needed to change. Some students were coming for the web design material, while others were more interested in the mobile application aspect. The material was thus split into two courses, with me taking over the new CS 4720: Mobile Application Development. Now that the course was focused solely on mobile apps, there was time to teach both Android and iOS development in one course. CS 4720 remains as one of the top electives in the department.

I have helped develop several other courses for the department as well, including Computer Game Design, the TA practicum course, and the capstone sequence. In all of these examples, the courses have focused on hands-on, group-based active and project-based learning. My software engineering background shows itself in the courses I design, as I try to drive students toward creating their own custom solutions that can become part of a portfolio that they can share with potential employers.

Curriculum Development

As the chair of both the Undergraduate Curriculum Committee for the department and for the School of Engineering and Applied Science since 2011, I have had the opportunity to work on curriculum improvements not only in the department, but also with others across the school. In all cases, I have strived to create impactful learning experiences for our students while balancing the needs of increased growth.

I have helped author two major revisions to the CS curriculum that have been in effect for a few years now. I was the driving force for revamping our set of CS 1 courses. I oversaw the change from Java to Python across all intro courses and creating a unified set of learning objectives and outcomes to ensure that no matter the intro course a student took, they would be prepared for CS 2. The other major revision was adding a two-course capstone sequence. I worked with Aaron Bloomfield to design the first incarnation of the capstone, the Service Learning Practicum, which he has successfully taught for the past several years. We designed the capstone, however, to allow individual faculty to have more say in the theme each year, so that no faculty member was locked into doing a specific type of practicum.

My current major effort is devoted to redesigning the entire CS curriculum. As the size of our two degree programs, the BA in the College of Arts and Sciences and the BS in the School of Engineering and Applied Science, have grown to be equal in size, issues have arisen due to the fact that the degrees have disparate requirements. Further, during a full analysis of our curriculum performed in 2014 against the IEEE/ACM 2013 Computer Science Curricula, we discovered some topic areas that were not being sufficiently covered in our core courses.

To address these challenges and create a more equivalent experience for all students, I am leading the CS Undergraduate Curriculum Committee through the creation of a new curriculum, broken into two distinct phases: 1) redistributing and refreshing our core material in a set of seven new courses called the Foundation Courses and 2) creating upper-level tracks for our students to allow for more specialization in their degrees. The pilot of the Foundation Courses is going forward during AY 2018-2019, with tracks coming in the next year. More information about the pilot can be found at http://pilot.cs.virginia.edu.

Assessment of Teaching Effectiveness

In this section, I will provide a high-level overview of my teaching evaluations and other evidence of my effectiveness as an instructor. My complete set of evaluations can be found on my website, http://marksherriff.com/category/teaching.html.

Teaching Awards

I have been recognized multiple times for my teaching by both my students and my colleagues:

Major Awards:

- 2016 IEEE Computer Society Computer Science and Engineering Undergraduate Teaching Award
- 2014 University of Virginia All-University Teaching Award
- 2010 Hartfield-Jefferson Scholars Teaching Prize ($12.5K, first year ever awarded)

Organization Awards:

- 2012 UVA Association for Computing Machinery Computer Science Professor of the Year
- 2011 Trigon Engineering Society Thomas E. Hutchinson Faculty Award Winner
- 2010 UVA Association for Computing Machinery Computer Science Professor of the Year

These awards include an international professional society award, a university-wide teaching award, the largest teaching award in SEAS, twice being honored by an Engineering honor society, and twice being honored by students specifically in the CS department. I am proud of these accomplishments and very grateful to the organizations that recognized my efforts.

The IEEE Computer Society Computer Science and Engineering Undergraduate Teaching Award is given to one person annually "for outstanding contributions to undergraduate education through teaching and service, and for helping to maintain interest in the field and make a statement about the importance with which the IEEE Computer Society views undergraduate education." My specific citation that came with the award stated that it was given "for outstanding contributions to undergraduate computer science education through innovative teaching and commitment to increasing enrollment and diversity in computer science programs."

The Hartfield-Jefferson Teaching Award, given by the Jefferson Scholars Foundation, honors those that "exemplify the highest standards and practices of the teaching profession." Winners "demonstrate knowledge, exceptional commitment to the education of undergraduate students, and passion both for their subject and for advancing the University's curriculum." The Thomas E. Hutchinson Faculty Award "honors professors who have demonstrated a love of teaching, genuine outreach to their students, and have significantly contributed to the engineering school. The faculty award is completely chosen by engineering students."

Teaching Evaluations

Overall, my teaching evaluation scores have been above average for SEAS averages in every semester and in nearly every category. My full evaluations are available on my portfolio website, but collected here are the scores from two questions that I believe accurately portray my effectiveness: "Overall, this was a worthwhile course" and "Overall, the instructor was an effective teacher." All of my evaluations are available at http://marksherriff.com.

Student Comments

Below are selected student comments from each of my courses, highlighting both positive feedback and areas where improvement is still needed.

CS 1110

Positive Comments

"Professor Sherriff is an amazing professor. I looked forward to going to class every day. I don't think I've had a class at UVA that has been quite as amazing as this one."

"I genuinely enjoyed going to Professor Sherriff's lectures. He not only presented the information in an effective manner, it was entertaining and he didn't always just lecture, he let us interact. I wanted to go to lecture because I knew it wasn't going to be dry and boring and that I would actually learn something relevant to the course."

As someone who has done theater for a long while, I recognize that it takes a lot to keep several hundred people's attention for an extended period of time. I am pleased whenever students say they enjoy coming to my class.

"I had literally no programming experience prior to this course, and was concerned about its difficulty. I am doing very well in the course, largely in part because of Professor Sherriff's commitment to his students and his course. This was easily the best class I have taken at UVA."

Even though this might have come from a first-year student, it's still very nice to hear.

"Loved the course, it made me change my major to CS. Mark Sherriff is a great teacher, he is really involved in the class and easy to talk to. Even when I some trouble with submitting a homework assignment he was very understanding and pragmatic with how he handled the matter. Go Sherriff! I laughed when filling out number 19 on this form because there is no bubble for "I never got around to buying a textbook." Not saying you are a BAMF or anything... but you kind-of are....!"

"This was my favorite class that I have taken at UVA so far. The content was interesting and very useful, the lectures were engaging, and the tests were fair. I learned a ton in the class and can't wait to pursue a computer engineering major. Also, Sherriff is awesome!"

"Professor Sherriff and this class were great! Prior to taking this course, I had no interest in majoring in Computer Science. I was only taking it so that I could minor in Systems Engineering. As a result of having Professor Sherriff (and thanks to his enthusiastic teaching), I declared my BACS. Furthermore, I enjoyed this course so much, that I am taking CS 2110 with him this summer."

I love bringing in new majors.

<u>Areas for Improvement</u>

"Sherriff has a great personality, and truly makes class fun and engaging. That being said, I can't say I really learned anything during the lectures, but was rather introduced to concepts to which I would have to go back and learn later. I think his lecture style would be extremely effective if one already knew the material, or had learned it, and used the class as a review. I just think the lectures were so fast that it is hard to learn the material. That being said, I don't know if this is due to Sherriff or just the topic of CS. Regardless, Sherriff made the class fun, which is a heck of a lot better than many other teachers."

There are certainly times when I do get moving a bit quickly. 1110 is a difficult course in that the range of abilities is vast, and teaching to the middle often leaves some behind or makes it boring for others. I need to be more cognizant of those that might be getting left behind. I have been trying to have recitation sections for those that need more assistance, but attendance varies greatly.

"I really enjoyed this course in the beginning, but it felt like as soon as we reached loops, things started to speed up significantly and I struggled to keep up with the subject matter. I know that it is unlikely that you would be able to slow down the subject matter, because there is a lot to get through, but in the beginning everything was pretty slow and I understood fairly well, but later on in the course I felt like I was lost. One recommendation I would have is that a lot of time it seemed like we would start doing a homework and have no understanding of what we were suppose to be doing and then after the homework was due, we would practice the material that was on the previous homework. I would personally prefer if this was reversed."

In any course, timing the lectures with a pre-set homework schedule can be difficult. I do need to be a bit more aware of my timing so that things don't get done out of order. In my defense, they always do a lab on the material before the homework is due.

"While upbeat and open during lectures, one on one Mark is unprofessional and patronizing to students. His nasty attitude discouraged me from coming to him for help out of fear that I would be mocked and humiliated for asking stupid questions."

I suppose there's always someone like this, especially in a class of 484 students. I honestly don't know what happened here. Have students caught me at bad times? Certainly. Do I think I was ever

unprofessional? No. I do know that my sense of humor might get me into trouble sometimes, and that's something I certainly should watch, but I'm not sure where the "Sherriff is a different person outside of lectures" comes from.

CS 2110

Positive Comments

"Possibly one of the best teaching faculty I have had, he enjoys his class clearly and every day comes with a positive attitude towards the class. He is clearly passionate about what he teaches and true to himself. He made me enjoy CS as I never thought I would specially after such a bad experience in CS 101. He made cs one of the classes I enjoyed and learned the most and even almost made me change my mind about my major. GREAT professor"

"After getting through CS 101, I thought that future CS classes would be just as dull and nearly impossible to understand, but Professor Sherriff was a fantastic professor who helped me understand the concepts of software development and more advanced Java concepts. This course changed my opinion on CS and now have an even better grasp on the Java material."

"This was a great teacher and class. It has made me feel confident about proceeding with a CS major. You can tell that Professor Sherriff is constantly trying to make the class better in any way he can and it pays off by making this one of the best classes I have had. The podcasts are extremely helpful and if they had a picture of the screen to go along with it would be perfect."

"One of my favorite professors that I have had so far. He is very animated and makes learning the material very enjoyable. I really like his analogies to make us understand topics, even though some of them were very quirky."

Areas for Improvement

"Unfortunately, I became very deterred from going to office hours after the first two times I went. It seemed as though Professor Sherriff was annoyed by some of the questions I was asking, and didn't care to look at some code/go the extra mile to really help me. Despite people always saying he was approachable and really helpful in office hours, I did not find this to be the case."

Another instance where someone apparently caught me on a bad day. I'm not really sure what I did or didn't do, but I need to make sure I'm at the top of my game in personal interactions in addition to in class. I know this is an isolated incident (as my other evaluations attest at my ability to interact with students) but I still don't want to let any one student down.

"This should be a 4 credit class"

A constant complaint from 1110 and 2110. And I agree with them.

"If possible, the podcasts would be much more useful if we could somehow see what's going on in class - even if it were just a screen shot of your computer or something."

I've considered this, but it doesn't work well with my teaching style. I don't actually use many slides anymore and just use the chalkboard. So, while the podcasts aren't the absolute best thing I could do, it seems to work well for most students.

CS 3240

Positive Comments

"Professor Sherriff consistently proves to be the best teacher I've had in all of UVA so far. Grading is fair, he answers his email quickly like a champ and the projects are grueling but awesome. CS 3240 was an outstanding class, very true to the real world of software development as I've already

experienced in an internship. Death by documentation is annoying, but realistic, and the joy of seeing those darned robots finally do their thing right after an all nighter is awesome. I have plenty of reason to vent frustration here, I spent lots of late nights trying to get the stinking bluetooth to work, or trying to make that demon possessed android do my bidding, but when I step back and look at this course as a whole, it's without a doubt the kind of course I had hoped I would take when I used to think about college in my high school days. On a side note, I recently showed a prospective CS student around UVA, and when he asked about the CS department, I was able to say without a doubt that the big three of CS (Sherriff, Bloomfield, Horton) make CS a great experience, even early in the program."

"To put how awesome Professor Sherriff is in perspective: there is approximately zero reason to come to class - no tests (besides the midterm), no quizzes, it was all the project and coming to class didn't really effect how you did on the project too much - yet EVERYONE still came. That does not happen in college."

"This was a typical Sherriff course: fun and entertaining lecture moments, some hard days (or nights) of project work and an overall great learning experience. The projects were well thought out and conveyed the ideas of the software development accurately."

Interesting to find out I had a "typical" course-type.

Areas for Improvement

"There are so little amount of lectures for this class. Many of classes were focused on projects. Because of this, I did not learn that much from this class that is really new and interesting. I think the professor should spend less time in talking about projects during lectures, because it wastes time. Also, I don't like the fact that professor did not have slide shows for some of the materials. Not having slide shows made some students like me harder to study for exams."

It was a project-based course, and thus I felt it did require a bit more time in class to focus on how the projects would work. I do recognize that I didn't have as many slides here, due to using a new textbook. I should provide more resources for studying in this scenario.

"All that documentation seemed like busywork."

While the documentation was somewhat the point of the course, I should probably emphasize more why it's so important.

CS 4720

Positive Comments

"I really enjoyed taking this course with Professor Sherriff. He was very knowledgeable and enthusiastic about the material he presented to us, which in turn made it very easy to learn and take a lot out of this class. His engaging teaching style made attending lecture an incredibly enjoyable experience and the course helped teach all about web and mobile frameworks and architectures. I highly recommend this course to anyone interested in the Internet or mobile phones. Professor Sherriff is easily one of the best professors I have had at the University."

"Professor Sherriff did a great job at teaching this course. His lectures were engaging and easy to follow. The project was fun and helped us learn a lot about Android development. I feel that I learned a lot about development on both web and mobile platforms and am better prepared for future interviews/internships."

"This was my first time taking a course with Professor Sherriff, and it was without a doubt the best CS course I have taken thus far. The information you will learn in this class is incredibly relevant in today's technology and is extremely useful for real world applications. From learning the intricacies of web development to building your own Android App, this class pretty much covers it all. It is certainly a fast paced course, and you will have to learn a bit on your own, but Professor Sherriff's enthusiastic lectures and passion for teaching definitely makes this class worth it!"

"Since course-specific questions were covered previously, I just want to make a few comments about Professor Sherriff. This is an immensely popular class, and for good reason; the subject material is engaging and fulfilling, and it is exceptionally well-taught. Professor Sherriff is everything one expects from teaching faculty at a large university, and more; he makes a significant effort to go above-and-beyond his duties as a purveyor of material. Sherriff includes interactive activities in the classroom, and makes himself constantly available for extra help. I found that I was always able to receive a prompt reply to emails, and my questions were answered thoroughly and to my complete satisfaction. The classroom teaching style is somewhat informal, but the appeal of this, I suppose, is somewhat subjective. While there were sometimes tangents which seemed irrelevant in class, they usually ended up adding to the overall material; if nothing else, they certainly made Professor Sherriff more personable and approachable. So, overall, Professor Sherriff is one of the most effective teachers under whom I have ever had the pleasure to be a pupil, and I consider myself extremely fortunate to have experienced this course."

"Very great introductory course to mobile apps. We touched on everything I would expect to learn about mobile apps, and had assignments that were well timed and helped us learn the info we needed to know. Only issue was with finding partners, maybe in the future try to implement some system of assigning partners for those that don't have friends in the class."

Areas for Improvement

"Please please please please please grade things faster! Really. It was the one thing that kinda made me a bit nuts."

"As I said before, would have liked to get feedback on the project earlier so that we could have made changes on what you didn't like"

This course had 83 students in it and taught me that this course couldn't not go this large again. It did affect the quality of the instruction, mainly the response time to assignments.

"I loathe RoR, with a passion!!!!"

RoR stands for Ruby on Rails and was a platform choice I made for the class. I probably won't choose that again as it created a number of headaches for me and the students, and did lead me to be short with a couple of students, unfortunately.

"Nice course but very much a "go teach yourself" course."

It's no secret that I expect fourth-year CS students to have to do some learning on their own. I give them guidance, certainly, but sometimes that's not enough for everyone.

CS 4730

Positive Comments

"This class was great. I loved the project and thought the material was exceptionally well organized. I do however have some comments: The reason I said that the team size was not appropriate for this assignment was that I had a particularly bad experience with mine. I think that a team of four people who are all motivated is reasonable for making a polished game. My team basically boiled down to two people doing 90% of the coding, which was completely unreasonable for the scale of this assignment. I think that the gamification was held back by the gamercard. It did not always seem entirely functional and a good number of features were not implemented until we were well into the course. I think that the system could potentially be awesome, but features should be removed until they work and are going to be receiving the same amount of attention as the others (what even are achievements?). There is a ridiculous amount of stuff going on in there too; It wouldn't hurt to get a UI person to overhaul the interface. That being said, XP was amazing. The class also had a slight issue with busywork. I think that the critical eyes and written words were extremely useful assignments for the first few times we did them. That being said, having one due every week was very much overkill. I think about half as many would be appropriate. The later ones just felt repetitive and I think I can honestly say I didn't gain anything significant from them. Peggle was also an annoying choice for a required game. I think it is interesting and fun as a game, but it also requires downloading the sketchy pogo game player thing that seemed like

malware (it actually came with a toolbar) and it was Windows only which was extremely inconvenient. I could not find the Mac-demo that the Professor mentioned."

"The lectures were generally interesting and useful. The project was fun and gave valuable experience. The team size was good, because it was large enough to get a lot of work done but not so big that communication was difficult."

"I enjoyed the course overall and completing the game, though I sunk many hours into the game, was satisfying. I think you could have spent less time on the McGonigal material/History (maybe combined the two lectures?) and started the "Game Design" part of the course earlier, which would have allowed for more time on the project. As stated earlier, I think VP, while good at getting students engaged, was less effective due to how late the VP store opened. Also, titles/achievements/etc. weren't really applicable for this semester's course."

"Professor Sherrif is a dynamic professor who effectively teaches the course from a more aesthetics- driven perspective. The course could contain more technical content but that is up to the Professor's discretion. The XP system needs a little tweaking but is an interesting alternative grading system."

"This was a great class. Professor Sherriff is a really engaging lecturer and makes his class extremely entertaining. I've enjoyed every class I've ever taken with Professor Sherriff and I wish he taught more classes that I could take."

Some of these comments are around my use of various gamification elements in the course. And, as you can see, some worked better than others.

Areas for Improvement

"As someone who didn't have a personal relationship with the instructor, it seemed very difficult to get VP. I know some people who you didn't know well got a lot of it, but I believe that you can see that you knew a lot of the people who had a lot of VP decently well. You frequently seemed unapproachable and cranky. You really love games, and it shows. Everything was well put together and was easy to understand. The project was just difficult enough to be a challenge, but I enjoyed it, unlike most of my other projects here."

"Professor Sherriff is great although sometimes condescending. Great course overall. Project is a great length."

I seem to get some comment along the lines of "he's grumpy" or "he's condescending in office hours" and I have yet to really figure these out. I have tried to be more conscious of my mood and demeanor whenever students drop by, even at inopportune times. I recognize that I often "wear my emotions on my sleeve," which probably does contribute to this. I know that I need to continue to work on making sure my office is a welcoming place for all students.

CS 4750

Positive Comments

"Sherriff makes coming to class at 9:30 in the morning exciting and worthwhile."

"One of the most practical courses I've taken at UVA. I'm sure the material covered in this course will prove to be highly useful in my future career."

"Mark Sherriff is one of the best professors I have ever had. He works hard to incorporate technology in the classroom and engage his students. It has been an honor to be his student."

"Prof. Sherriff is one of my favorite teachers at UVA, and easily one of the top teachers in the CS department. His lectures are lively and entertaining, even at 9:30 in the morning. He is clearly knowledgeable of the subject material and frequently makes connections to real-world applications, which is very helpful. Of all the other classes I've taken in the department, I find that I pay the most attention to his. His passion for the subject is infectious, and I hope to take more classes of his in the future."

Areas for Improvement

"You can lead a horse to water but you can't make it drink; I would suggest having more "checkpoint" like assignments on the project to discourage people from putting it off until the last minute in the future. (Show me the stardock print out of your schema, show me a screenshot of a page to login/access data/do a report, etc). With the understanding that things will probably still change after that checkpoint but just so that you know students HAVE created their tables at least, and HAVE done a little bit of web coding."

Again, in a large class, I found it hard to make people accountable for certain things without the assistance I needed. I needed to facilitate this better.

"Sherriff is a great teacher, and he did a solid job teaching the material. The one misstep, as I see it, was the SQL coverage--particularly the questions on the test. There was one question in particular which I asked Prof. Sherriff about; he told me he couldn't help me with it and sent me to the TA. I asked the TA, and even he was hardly able to do it. The question was clearly unreasonable to ask on a test; I'm certain Sherriff himself couldn't have done it off-the-cuff in an exam situation. The course was overall really solid. Other than the occasional misstep, I was glad to take it. I did feel it could have been a bit more intensive, particularly as regards security matters, but even so I learned a lot."

I might have stretched them a bit on a few questions. And this student is right – I might not have been able to do the question "off-the-cuff," but I was more interested in seeing their thought process.

"I'm not a fan of project-based learning where most of the effort goes into things unrelated to the course material. "But those things are still important!" you might object. So is physical fitness, but we're not going running and doing push-ups for homework... The scope of the class is databases, not web design, not software engineering. We should be learning about databases! The same thing happened in the CS3240 project; so much effort went into the specifics of the project, such as snapping Lego blocks together, that ideas like requirements analysis and rigorous testing -- the actual course material -- became a secondary hassle. In CS4750, reasoning about databases was only a tiny part of the project... that means something is wrong! Even the things we did learn about databases were often superficial and vocational. We should be focusing on the internals of the DBMS before worrying about specifics of SQL. Maybe people in industry are asking for graduates that know SQL, but, as Dijkstra said "it is the task of the first-class University to tell industry what it does not want to hear" (EWD 1165). Google can teach me about tools. University should teach me the fundamentals."

I'm not really sure how to respond to this one. I feel the material was definitely about databases. True, the project required some software engineering concepts, but so does any software construction exercise. I do come from a software engineering background, so it does make it tougher to separate some of those lessons from other courses.

Efforts to Improve Teaching

I do several things to try to improve my teaching each semester. These fall into a few discrete categories: iterative course feedback, external review, and professional involvement.

Iterative Course Feedback

My main avenue for providing feedback to myself is through student comments and feedback. I always leave anonymous feedback turned on, regardless of what I might get back from it. Further, I add numerous extra questions to my course evaluations each semester to provide more fine-grained information about particular parts of my courses. Students are always welcome to send me feedback in any form.

Another technique I use to provide more feedback to myself is through my course podcasts. While I certainly do the podcasts for my students' benefit, they are also invaluable to me as well as I go back and listen to what I covered on a given day. It's also very helpful to be able to go back to previous instances of a course to hear exactly how I presented material in other times.

External Review

Over the past several years, several colleagues have observed my courses. Originally my faculty mentor when I arrived at UVA, Prof. Tom Horton has been a major influence on my teaching and course management. His guidance and feedback over my career has been invaluable. His years of experience and calm demeanor have made him an absolutely perfect mentor for me and I could not underestimate his contributions in guiding me in my career to this point.

Other faculty in CS have also had the opportunity to view my teaching. Profs. Aaron Bloomfield, Jim Cohoon, and Marty Humphrey have each seen me teach under varying circumstances. Their feedback has also been quite excellent, and I thank them for their assistance.

Professional Involvement

While at UVA, I have availed myself of the resources both at UVA and in the greater CS education community. The seminars and programs offered by the Center for Teaching Excellence helped me get my footing here at UVA and were quite useful in the first years of my career. Outside of UVA, I routinely attend and present at educations conferences in both computer science and engineering as a whole. These experiences have provided valuable external input on my teaching methodologies and have given me numerous ideas about how I could improve on my own teaching.

Links Between Teaching and Research

I have focused on two main research areas in the past several years at UVA: the scholarship of teaching and learning in CS and the use of gamification techniques in college-level courses. With colleagues at NC State University and the University of Alabama, I have run five workshops to teach other CS faculty members how to do empirical research in CS education. Further, we have been doing a systematic literature review on the state of empiricism in CS education research, with a journal submission coming soon.

Every year, I attend the SIGCSE (Special Interest Group on Computer Science Education) Symposium, the main conference in CS education. At this conference, I organize and run the NSF Showcase with Prof. Aaron Bloomfield. This gives me an opportunity to work with education researchers from around the country and with representatives of NSF. These interactions have been quite valuable in shaping some of my teaching. Further, I attend the ASEE/IEEE FIE (Frontiers in Education) conference when I can, exposing myself to a broader range of educators.

While I enjoy attending these conferences, I do also go to present my own work. I have written several papers on CS education topics that have been published in various venues:

- Sherriff, M. and Floryan, M. "Achievement Unlocked: Investigating Which Gamification Elements Motivate Students." The 123rd ASEE Annual Conference and Exposition, New Orleans, LA, June 24-27, 2016.
- Al-Zubidy, A., Carver, J., Heckman, S., Sherriff, M. "A (Updated) Review of Empiricism at the SIGCSE Technical Symposium." The 47th ACM Technical Symposium on Computer Science Education, Memphis, TN, Mar 3-6, 2016.
- Bloomfield, A., Sherriff, M., and Williams, K. "A Service Learning Capstone Practicum." The 45th ACM Technical Symposium on Computer Science Education, Atlanta, GA, Mar 5-8, 2014.
- Layer, R., Sherriff, M., and Tychonievich, L. "Inform, Experience, Implement - Teaching an Intensive High School Summer Course." The 42nd Annual Frontiers in Education (FIE) Conference, Seattle, WA, Oct 3-6, 2012.
- Sherriff, M. "Teaching Web Services and Service-Oriented Architecture using Mobile Platforms." The 40th Annual Frontiers in Education (FIE) Conference, Washington, DC, Oct 27-30, 2010.
- Krogius, O., Horton, T., and Sherriff, M. "Role of Larger Software Artifacts in Introductory Computer Science Courses." The 40th Annual Frontiers in Education (FIE) Conference, Washington, DC, Oct 27-30, 2010.
- Lew, M., Horton, T., and Sherriff, M. "Using LEGO MINDSTORMS NXT and LEJOS in an Advanced Software Engineering Course." The 23rd Annual IEEE-CS Conference on Software Engineering Education and Training, Pittsburg, PA, Mar 9-12, 2010.
- Sennett, J. and Sherriff, M. "Compatibility of Partnered Students in Computer Science Education." The 41st ACM Technical Symposium on Computer Science Education, Milwaukee, WI, Mar 10-13, 2010.
- Burg, J., and Sherriff, M. "Unix Tutorials to Move Students from PC/Windows to Unix." ED-MEDIA 2002 Conference, June 30, 2002.

These papers are available on my website. Each of these papers highlights a different teaching technique, methodology, or course that I implemented at UVA, showing the recognition by my peers of my work in CS education.

Senior Thesis Projects

While I have directed several senior thesis projects, some were specifically in CS education, specifically:

- Cameron Blanchford (2017) – XP Systems for Gamified Courses
- Qian Xiang (2017) – Competition in Gamification Courses
- Isaac Tessler (2017) – Teaching with Various Fidelities of Virtual Reality
- Jennifer Lu (2014) – Gamification in Education
- Anna Greene (2014) – Gamification in Education
- Travis Pennetti (2013) – Educational Video Games
- Erik Davis (2012)- An Evaluation of Python as an Effective CS1 Language
- Derrick Brameyer and Alan Kush (2011) - Agile Development in Student Projects (Ind. Study)
- Joshua Joyner (2010) - Lego Mindstorm NXT Sensor Simulation
- Emma Rosenfeld (2010)- Teaching Time Concepts to Early Elementary Students
- Steven Trombetta (2010) - PairEval v2.0

- Joshua Sennett (2009) - Compatibility of Partnered Students in Computer Science Education

I'm very proud of the work these students did and I hope to advise more projects like this in the future.

Dissemination of Teaching Materials

All of my course materials are freely available online and are routinely shared with colleagues around the country. I know that my materials for Mobile Application Development and Computer Game Design have been adopted by several faculty members, and probably more that I am not aware of. I strongly believe in the open sharing of course materials so that we can continually improve the courses that we deliver.

My work and advocating for pair programming (an extension of my work with my PhD advisor at NC State University, Dr. Laurie Williams) has had an impact both at UVA and at other schools. I have shared my knowledge of team creation and management with several other SEAS faculty at UVA and have given several presentations about it to over 100 high school teachers. They have also contacted me to let me know how their efforts have been going. I'm proud to say that my efforts in spreading pair programming as a mechanism for helping lower-level programmers has been successful.

Supplemental Materials

More information about me, my courses, my research, and my service is available at: http://marksherriff.com/

Example course materials available from latest courses:

- CS 1110 - Introduction to Programming - http://cs1110.cs.virginia.edu/f16/
- CS 3240 - Advanced Software Development - http://cs3240.cs.virginia.edu/s18/
- CS 4720 - Mobile Application Development - http://cs4720.cs.virginia.edu/s18/
- CS 4730 - Computer Game Design - http://cs4730.cs.virginia.edu/f17/