

Teaching Statement

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Teaching Approach

My instructional approach is shaped by my teaching experiences, research, and industry experiences. My teaching philosophy focuses on empowering students to pursue computer science and technology careers through *active learning*, *real-world examples*, and *diverse and inclusive learning environments*.

Active Learning: As an instructor, I will implement active learning into each class to help better understand and grasp lecture materials. To avoid teaching lectures for students to only take in information, I plan to support student learning and engagement by incorporating original, collaborative, and hands-on programming assignments and class activities. For example, a lecture about `while` loops in Python would consist of a presentation on the use of `while` loops and how they build on previous concepts covered in class, a demonstration of the `while` loop syntax, a discussion on practical examples of the concept in real life (i.e. video games), and a group activity for students to work together to implement Python programs that incorporate `while` loops.

Real-World Examples: The best way to prepare for a computer science students for industry careers is experience. Thus, as a professor I will attempt to simulate authentic programming experiences into classes by incorporating real-world software engineering tools and practices into courses. For example, I will provide realistic projects for students to practice skills necessary to develop and maintain production-quality software, grade programs using realistic code quality metrics such as passing unit tests and static analysis tool warnings, and encourage students to participate in industry practices such as pair programming, debugging, and code reviews. Additionally, I envision integrating my personal background and skills learned from my industry experiences into course lectures and materials. Furthermore, I will include relevant software engineering research findings into courses to increase awareness of cutting edge tools and practices among students and future developers, including my own work on improving developer behavior, decision-making, and productivity.

Diversity and Inclusion: Lastly, I will create open classroom environments that foster equal opportunities for all students to learn no matter their experience or background. As a course instructor, I believe it is vital to listen and support the needs of students in the classroom and one-on-one settings. This includes creating accessible course materials, accommodating different learning styles and preferences in lectures, and making course requirements and expectations clear. Additionally, I aim to provide multifaceted active learning opportunities for computer science majors and non-majors who may not want to pursue predominately coding careers by incorporating interdisciplinary materials. Finally, I will ensure all students have the opportunity to excel in Computer Science courses I teach independent of their race, gender, age, sexual orientation, programming experience, etc.

Teaching Experience

Instructor of Record: I was the primary instructor for the introductory Java programming course, *Introduction to Computing: Java* (CSC116), at NC State for the 10-week semester during Summer 2020. As the instructor of record, I was responsible for preparing lecture materials, delivering lectures, holding office hours, assigning and grading projects, labs, and homework, managing teaching assistants and graders, and more for a diverse class of students from various majors and backgrounds. Due to COVID-19, the class was taught remotely over Zoom instead of in-person. To incorporate active learning and increase student engagement virtually, I instituted a flipped classroom by prerecording lectures for students to watch asynchronously then integrating programming lab activities based on the lecture content during the designated lecture time. This was a valuable opportunity to motivate my teaching approach and gain experience as an instructor teaching Computer Science concepts to students.

Teaching and Communication Certificate: I am currently enrolled in the North Carolina State University Graduate School Teaching and Communication Certificate program to gain additional experience and training for effective communication skills. The Teaching and Communication Certificate requires completing 100 hours of approved activities and creating a professional development portfolio. Through this program, I have taken useful courses to improve my teaching approach with a focus on enhancing inclusivity in higher education such as *Accessibility in the Classroom* and *Teaching about Identities, Diversity, and Equity* (ECI509) to gain knowledge and learn techniques for creating accessible and inclusive content and materials for students.

Teaching Assistant: I was a Teaching Assistant (TA) for two undergraduate computer science courses as a Ph.D. student at NC State: *Software Engineering* (CSC326) in Fall 2015 and *Programming Concepts - Java* (CSC216) in Spring 2016. For CSC326, I was expected to teach two lab sections emphasizing concepts taught in lectures, act as the Scrum Master for teams during the final project, grade programming assignments and exams, attend lectures, answer student inquiries via email and Piazza, and hold office hours. For CSC216, I aided students during in-lecture activities, graded assignments and exams, and held office hours. These TA opportunities allowed me to gain experience interacting with students, performing instructional tasks, and guiding active learning activities.

Research: My research interests also motivate my teaching approach and span topics in Computer Science education. For an independent study, I developed a grading algorithm that incorporates automated program repair concepts to improve student feedback on introductory programming projects. Compared to a baseline approach, my algorithm increased student grades and only took slightly longer to run on a benchmark suite. For my dissertation work, I implemented `class-bot`, a system to improve student behavior by automatically updating GitHub issues on repos to notify students of their progress following software engineering processes. We found `class-bot` improved both project quality and student productivity. Additionally, I am currently working on a bot to increase student engagement and encourage consistent contributions and collaboration on team projects. As an instructor, I will continue to explore automating instructional activities and improving student programming behaviors to prepare them for real-world technology careers.

Tutoring and Service: I have also gained teaching experience through outreach focused on diversity and inclusion. In Summer 2019, I worked for The Coding School *codeConnects* program to increase participation of underrepresented groups in STEM. Through this mentorship and tutoring program, I spent 10 weeks teaching Python to a high school student online. I have also participated in many service opportunities focused on teaching Computer Science. With the NC State Minority Engineering Graduate Student Association (MEGSA), I volunteered at an INTech Mini-Camp to teach HTML and website design to African American middle school girls. Additionally, through the NC State Students and Technology in Academia, Research and Service (STARS) Computing Corps I volunteered to help teach Scratch, a 2D block-based programming language, to local underserved middle school students. These tutoring experiences and volunteer opportunities helped me gain experience teaching computing concepts to diverse groups of students.

Example Courses

Based on my experiences and interests, I believe I am equipped to teach undergraduate or graduate level *software engineering* courses to help students gain the necessary skills to build and maintain software systems. I can also teach *introductory programming* classes to teach basic coding concepts to students with little or no programming experience. I will be most effective teaching these types of courses in Python or Java, but I am also able to complete them in other programming languages. Below is a sample list of additional courses I would be excited to teach based on my interests, experiences, and current topics within the field:

- ***DevOps:*** A graduate or advanced undergraduate level course that focuses on providing an overview of DevOps concepts. In the course, students would learn about development and operations industry practices and tools for continuous integration, deployment, project builds, and more. The course would involve learning about these processes as well as completing a final project to automate software development tasks.
- ***Open Source Software:*** Another software engineering undergraduate or graduate level course focusing on contributing to open source software (OSS). This class would go over topics such as the importance of OSS, licensing, open data, and civic tech. Students would also be required to contribute to real-world open source repositories, such as projects in the Humanitarian Free and Open Source Software (HFOSS) Project¹ that produce software to solve real-world problems and benefit communities, throughout the semester.
- ***Software Engineering Research Seminar:*** An undergraduate or graduate level course that explores current topics in software engineering and computer science research. This discussion-based course would involve students reading publications, learning research practices, and designing a study to complete for a publication-quality paper.

Overall, I believe I can excel as a computer science educator for students by incorporating active learning into classrooms, helping students gain real-world knowledge and skills through course lectures, assignments, and projects, and creating engaging and inclusive classroom environments. With my teaching approach, prior experiences, and research interests, I will strive to provide relevant materials to support students to succeed beyond the course and to prepare them for future careers as computer scientists.

¹<http://www.hfoss.org/>