

# Teaching Statement

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Teaching is a challenging job, but nothing is more gratifying than concluding a successful lecture. I experienced this feeling when I taught MLT 2016 - Machine Learning Tool and Technique during my master's degree program at IIT Kanpur. This course was usually taught by my advisor, Prof. Harish Karnick. I had not expected the opportunity to teach a class, particularly this course, as a master's student. My chance arose as a sudden replacement because I was a teaching assistant for the course, and the primary instructor, Prof. Karnick, fell severely ill. Initially, when asked, the task seemed daunting. I wondered how I could match my professor's teaching skills and my immediate thought was to decline. Although I had been a teaching assistant for two courses previously, I knew that acting as the instructor was different.

After a reassuring email from the professor, I accepted the challenge. It involved just two lectures in one week, but I remember them vividly. I began by refreshing my knowledge of the course, then I reviewed the topics covered so far and what I needed to cover for the next class. I extensively examined the previous year's teaching content on my topics. The professor also provided some lecture notes for preparation. When teaching, one should utilize all available resources. After overcoming initial hurdles, I prepared the presentation material for the first class. Preparing teaching material and delivering it effectively to a large audience are distinct tasks; practice and preparation are essential. For successful teaching, one must excel in both. If the teaching content is subpar and does not cover the concepts well, students will struggle to understand. Conversely, if the content is excellent, but poorly delivered, the lecture will be ineffective, and average students will not grasp the concepts thoroughly.

During my undergraduate studies, I took a course where the lecture, though content-rich, was poorly delivered. For my lecture, I aimed to avoid this pitfall. Therefore, I decided to pre-deliver a recorded version of the lecture to my advisor and a labmate for feedback. To my surprise, the comments I received were insightful, both positive and negative. The positive feedback focused on the lecture content, particularly the examples and presentation animations I added. The negative feedback included comments about my nervousness and soft speaking. I incorporated these changes in another iteration before my final lecture, which was a great success. This experience made me realise that I could teach large classes effectively with adequate preparation. It was an excellent addition to my existing teaching assistant roles in MLT 2016 and OS 2016 at IIT Kanpur. I also gained experience teaching graduate students when I delivered a one-day tutorial at SIGML, IIT Kanpur, a Machine Learning group focused on graduate students and faculty interested in artificial intelligence. I have learned that creating good teaching content is the most challenging and crucial part, especially when dealing with tough topics like recent research surveys. Thoroughness is key, and one can expect more intriguing questions before and after class.

As a Ph.D. student at the University of Utah, I had the opportunity to learn about best teaching strategies in CS 6961: Teaching Computer Science in Higher Education. This course prepares students to teach basic computer science concepts at the university level, with a focus on teaching undergraduates effectively. I learned about various aspects of teaching, including tools (e.g., Mentimeter, Canvas, Piazza, Gradescope, Zoom), effective lecture delivery (demos and examples), course syllabi documentation, learning objectives, managing classroom issues involving student incivility, addressing and handling questions, presenting in large classrooms, preparing unambiguous assignments, fair and unbiased grading, handling late submissions, exam writing, preparing students, managing cheating, managing teaching assistants, ensuring a welcoming classroom environment considering diversity and inclusivity, and learning from course feedback.

As part of the mini-practicum, I had the opportunity to teach a week of CS2420: Intro to Algorithms and Data Structures, an undergraduate course. I prepared two lectures and an assignment on fundamental graph data structures and algorithms. The practicum allowed me to apply the principles learned in the course to real-world scenarios. For instance, I used Mentimeter for the first time, created a new assignment, used interactive demos for better explanations, and enhanced my lecture presentation and student question-handling skills. As an AI researcher, I am fascinated by the different paradigms of the Breadth-First Search (BFS) and Depth-First Search (DFS) algorithms. BFS explores, while DFS exploits; both concepts are frequently used in AI research. I believe teaching must be personal and focused on creating strong foundations. Therefore, I slightly modified the assignments to have students compare and contrast these two algorithms. This adjustment ensured that everyone grasped the basics and learned something additional. It was important that students, encountering graphs for the first time, developed a positive intuition and interest in the subject. As their instructor, it was my responsibility to guide these experiences positively and ensure they developed critical thinking and a solid understanding of the subject. Using visual examples, such as a running algorithm demo, meant I did not overwhelm students with technical details but rather focused their attention on key elements. The intuitive explanations encouraged students to engage in the hard work that follows, leading to a thorough understanding of the material.

Overall, I have realised that teaching an undergraduate course is more challenging than teaching a graduate course. Clarity and thoroughness in instructions, for both lectures and assignments, are paramount. It is also important to ensure that individual students can derive as many outcomes from the course as they wish. For some, it may be gaining an awareness of the bigger picture; for others, an introduction to the fundamentals; and for others still, a complete integration and expansion of the ideas presented in the course. Additionally, I believe that investing in constructing a framework of examples using publicly available tools and libraries is critical for providing inclusive undergraduate courses. Such efforts can help make learning more accessible and diverse, ensuring that students from various backgrounds are not unfairly disadvantaged and establishing a level playing field for all. Personally, I recognize that teaching is an iterative process, and that the more one practices, the better one becomes. All this experience has convinced me of the importance of teaching as a profession. In the future, I would like to continue teaching undergraduate foundational courses like Intro to Algorithms and Data Structures. Moreover, given my research background and extensive coursework in Natural Language Processing and Machine Learning, I am well-suited to teach advanced applied courses in these fields at the

graduate level. My positive experience organising data science seminars at the University of Utah has inspired me to offer more specialised research seminar courses on topics such as ethics and fairness in data science, advanced topics in Natural Language Processing, resource-constrained machine learning, and other research topics in interdisciplinary fields. In addition, I will continue fulfilling my duty of mentoring students, as my instructors did for me. I cherish these experiences and aspire to become an excellent teacher like them.