

Teaching Statement

Vivek Gupta

Computer and Information Science, University of Pennsylvania

My teaching journey thrives on a passion for making complex subjects accessible and creating enriching learning experiences. It's about guiding beginners, transforming intricate content into clear lessons, and effectively transferring knowledge, a process that brings me immense satisfaction.

1 Teaching Philosophy

Active Engagement Emphasis. A core principle in my teaching is fostering a dynamic environment where students are encouraged to actively engage, drawing from their diverse backgrounds and aspirations, especially in specialized areas such as Natural Language Processing. I acknowledge the diverse goals and varying skills of students in classes, and thus believe in creating a supportive environment that caters to these differences. In my teaching strategy, I actively employ break-out rooms and the flipped classroom model to engage students and enhance discussions. The integration of technology, like learning management systems and discussion forums, is key in promoting open and inclusive communication, enriching the overall educational experience.

Fostering Research Intuition. At the heart of my teaching philosophy lies a dual focus: imparting robust research methodologies and nurturing a profound intuition for research in my students. I endeavor to empower them to craft research questions that are not only insightful but also deeply impactful, aligning seamlessly with their unique academic pursuits and passions. This educational approach goes beyond the traditional boundaries of mere information transfer. It's about fostering a culture of intellectual curiosity and critical analysis. I aim to instill in students the ability to think divergently, to question existing paradigms, and to innovate within their fields of study. This cultivation of a critical and innovative mindset is crucial in preparing students to become thought leaders and pioneers in their respective domains.

2 Teaching Experience

Lessons from Teaching Course My time in *CS 6961: Teaching Computer Science in Higher Education* at the University of Utah was instrumental in refining my teaching approach, particularly in teaching methodologies and the use of interactive tools for undergraduate education. This course trains next-generation teachers (PhD, PostDoc) in teaching basic computer science at the university level, focusing on effective methods for undergraduate instruction. It covers a wide range of teaching aspects, including the use of various tools (like Mentimeter and Zoom), strategies for lecture delivery, syllabus creation, setting learning objectives, and classroom management, including addressing student questions and incivility. The course also emphasizes clear assignment preparation, fair grading practices, exam writing, handling academic dishonesty, managing teaching assistants, fostering an inclusive environment, and using feedback for improvement.

Learning from Teaching Practicum. My approach is characterized by a balanced integration of theoretical principles and practical applications, as exemplified in my teaching of an undergraduate level course, *CS 2420 - Intro to Algorithms and Data Structures*¹ at the University of Utah, where I employed interactive tools and tailored assignments for deeper comprehension of Graph algorithms and Data Structures. I prioritize a teaching style that adapts to student needs, ensuring that the content is not only comprehensively covered but also resonates with diverse student interests and learning paces. During the practicum, I applied course principles to real-world teaching scenarios, utilizing tools like Mentimeter and interactive demos to enhance lecture delivery and student engagement. As an AI researcher, I integrated the BFS and DFS algorithms into my teaching, focusing on their distinct roles in AI research. I modified assignments to encourage students to compare these algorithms, fostering a strong foundational understanding. This approach aimed to develop students' positive intuition and interest in graph theory, emphasizing visual examples and intuitive explanations for better comprehension and critical thinking.

Teaching a lecture of *MLT 2016 - Machine Learning Tool and Technique* course at IIT Kanpur was notably different from undergraduate teaching experiences. Unlike undergraduates, graduate students typically possess a stronger foundation in the subject, allowing for deeper, more complex discussions. This necessitated a shift from basic concept introduction to exploring advanced applications and theories

¹ Online Lectures: <https://www.youtube.com/watch?v=rWvH6JX3f3w&list=PLWHI5y52tsyrW2G5nkoeGb5k1E09pBFw7>. Course feedback for both the Fall 2021 and Spring 2022 semesters is available upon request.

in machine learning. Additionally, graduate students often engage more critically with the material, requiring a more interactive and dynamic teaching approach. This contrasted with the more structured and guided learning often needed at the undergraduate level. The experience highlighted the need for adaptability in teaching methods and content depth, tailored to the advanced academic maturity of graduate students.

Experience Beyond Classroom. My teaching and mentoring experiences have been both diverse and enriching, significantly contributing to my expertise in graduate-level education. I have served as a teaching assistant for two prominent courses at the University of Utah: CS 6355: Structured Prediction and CS 6150: Advanced Algorithms. Additionally, my involvement in MLT 2016 - Machine Learning Tools and Techniques and OS 2016 - Operating Systems has been instrumental in broadening my teaching scope.

3 Mentoring Experience

Research Mentorship. My journey through my PhD and PostDoc phases has been profoundly enriched by my commitment to mentorship. I have had the privilege of guiding over eighty students at various stages of their academic careers, including undergraduates, masters, and Ph.D. candidates, across multiple universities. This diverse mentorship experience, a testament to my dedication to academic development.² The collaborative efforts with my mentees have often led to publications at top-tier NLP conferences, showcasing the practical impact and quality of our research. My mentorship role has been crucial in honing my teaching skills and creating an environment that encourages critical thinking and innovation. By providing personalized guidance, I have aimed to make a significant impact, preparing future scholars and professionals for their careers. This dedication to mentorship reflects my deep commitment to advancing learning and knowledge.

Cultivating Research Ecosystem. In addition to this, I have taken on significant roles in one on one teaching mentoring. As a Teaching Mentor some students for CS 2420 and CS 6150 at the University of Utah, and a one-on-one tutor for Natalie D. Cottrill for the CS 6150: Advanced Algorithm course, I have been able to directly impact the learning and development of students in complex subjects. My engagement in the academic community extends well beyond the traditional classroom setting. I actively coordinate science clubs, including SIGML at IIT Kanpur and the Utah Data Science Club, and collaborate with fellow faculty members to organize insightful seminars. These efforts highlight my dedication not only to teaching but also to the wider dissemination of knowledge and fostering a vibrant academic community. Through these initiatives, I aim to create platforms for knowledge exchange and collaboration, further enriching the educational experience. For insights into the impact of my teaching and mentoring, feedback is available upon request.

4 Future Teaching Plans

My diverse experiences have profoundly shaped my educational approach, particularly in the evolving realm of Natural Language Processing (NLP). This journey has highlighted the necessity of innovative teaching and the need to stay abreast of emerging trends, guiding me to develop course content that is not only contemporary but also visionary. My mentorship philosophy extends beyond conventional teaching, aiming to foster students' personal development and ignite their passion for exploring new technological and research frontiers.

Teaching Aspirations. I am enthusiastic about continuing to teach foundational courses at the undergraduate level and delving into advanced topics in Natural Language Processing at the graduate level. Specially for graduate courses, focus on concentrating on practical assessments involving modern essential libraries for real project development, thereby bridging the gap between academic learning and real-world application.

Innovative Course Development. Leveraging my experience in seminar organization, I aim to create specialized courses focusing on data science on structured knowledge graphs or semi-structured tabular data, cutting-edge NLP with Large Language Models (LLM), and interdisciplinary aspects of NLP such as ethics and fairness. Especially focusing on designing a curriculum that accommodates a variety of abilities and perspectives, considering students' varied backgrounds in linguistics, mathematics, and programming. I

² Research Mentees: <https://vgupta123.github.io/mentor.html>.

will prioritize delivering concise lectures coupled with discussion sessions. For larger classes, I concentrate on practical, hands-on assessments, carefully coordinated with teaching assistants, to ensure each student receives the needed attention and support.

Concluding Reflections For me, teaching is an ever-evolving journey, rich with opportunities for both learning and growth. My aim is to cultivate an inclusive and dynamic educational atmosphere that not only embraces but also challenges students of diverse backgrounds. This approach, I believe, is key to preparing them for their future roles in technology and research. It fosters continuous development and necessitates a readiness to adapt, ensuring that both educators and students are engaged in a process of perpetual advancement and discovery.