Teaching and Mentoring Statement

Jie Wang
School of Industrial and Systems Engineering, Georgia Institute of Technology, jwang3163@gatech.edu

Teaching has been one of my greatest passions throughout my academic journey. I am enthusiastic about working with young, fresh students and witnessing how they apply critical thinking and innovative solutions to real-world problems. I enjoy standing in the classroom to give chalk talks for several weeks, continuously refining the most effective ways to deliver core concepts, simplifying complex materials to foster intuitive understanding, and unifying the knowledge tree by connecting diverse topics. My overall teaching principle is to (1) show respect for and care about the needs of all students, (2) help my students grasp an intuitive understanding of course materials, and (3) cultivate the critical thinking and independent study skills of my students. In the following, I will highlight my past teaching experiences [1], teaching philosophy, future teaching plans, and mentoring.

Past Teaching Experiences. I am fortunate to have broad and rigorous training of teaching during my doctoral study at Georgia Tech. In 2024 Spring, I served as a student instructor for the course *ISyE 3770: Statistics and Applications* with class size `60`, which is a core course required for all undergraduate students from electronic engineering and computer science majors. Students will learn topics including the basics of probability, point and interval estimation, and hypothesis testing. I was responsible for preparing lecture notes and slides from scratch, creating weekly homework and monthly exams, and delivering 3-hour lectures per week. At the end of the semester, I received an overall effectiveness score of **4.2 out of 5.0**.

In 2024 Summer, I served as the student instructor for a difference course *ISyE 3044: Simulation Analysis and Design* with class size `42`. This course taught how to design and implement algorithms to simulate discrete and continuous time events to model real-world applications. Students in my class come from the similar background as my last experience, and I found many of them perform better in programming than mathematical deviation. Thus, I reorganized the course materials to focus more on intuitions of algorithm design and details of implementation while emphasizing less on mathematical proof. Besides, I collected the student's feedback per week so that I could adjust the lecture delivery style to accommodate students' needs as quickly as possible. At the end of this summer, I received a much higher overall effectiveness score of **4.8 out of 5.0**, whereas the average score over all instructors in my department is 4.2.

I have also been a teaching assistant for two classes: Engineering Optimization (virtual class in Fall 2020) and Design and Analysis of Experiments (DOE) (in-person in Fall 2021). The DOE class is a popular choice for graduate students from data science background, and I met weekly with students to review course materials and walk them through problem sets. During my teaching assistant in the DOE course, the students rated my overall effectiveness as **4.7 out of 5.0** with a class of size `54`.

Teaching Philosophy. Drawing from my teaching experiences, I will share my teaching philosophy in three principles below.

(1) **Know Students Well**: At the start of each course, I make it a priority to learn every student's name, personality, and background. I also regularly conduct surveys to gather feedback. This approach allows me to adjust my teaching style to satisfy the needs of each class. Understanding my students and their concerns is essential to creating an effective and supportive learning environment.

(2) **Make Lectures Engaging**: I view each lecture as a show, where my goal is to present complex concepts in an engaging and accessible manner. Early in my teaching journey, I found many

[1] My course evaluation reports can be found at https://walterbabyrudin.github.io/Teaching_Evaluation.html.

students struggled with complicated concepts. To circumvent this, I usually share my past experiences as a junior student on how to resolve similar challenges. By providing interesting stories and insights of my thinking process, I help students gain a clearer understanding of the material.

(3) **Cultivating Critical and Independence Thinking Skills**: I aim to cultivate critical and independent thinking skills for all my students. To encourage this, I extend certain topics for independent exploration and include related questions as bonus assignments. In class, I present example questions and give students time to work through them before showing solutions. This approach reinforces their ability to think critically and independently, fostering stronger learning skills.

Future Teaching Plans. I list the following courses that I am fully prepared to teach at both undergraduate and graduate levels:

- Optimization
- Statistics and Applications
- Simulation and Stochastic Models
- Design and Analysis of Experiments
- Machine Learning
- Operations Research
- Stochastic Processes
- Information Theory

Given the opportunity, I am also interested in designing a project-oriented course for graduate (or senior undergraduate) students that focuses on establishing machine learning models for social good and explores critical societal values like energy efficiency, privacy, fairness, and interpretability. Besides, I am open to designing new courses from scratch. For instance, I am interested in opening a new course titled "Distributionally robust optimization (DRO): from Theory to Practice," which will teach the statistical approaches to build good DRO models, optimization approaches to solve the formulation and key applications of DRO in machine learning and operations research.

Mentoring. I was fortunate to be mentored by top scholars during my undergraduate study at The Chinese University of Hong Kong, Shenzhen. This experience was invaluable, as it inspired my research interests, sharpened my research taste, and helped me develop a unique approach to formulating and tackling research questions. After moving to Georgia Tech, I carried these research insights and remained eager to collaborate and mentor undergraduate and junior Ph.D. students. For example, during my first-year Ph.D. study, I mentored an undergraduate student, Zhiyuan Jia, on a network coding research project. I guided him weekly, helping him grasp foundational knowledge in the field and encouraging him to design and implement optimization algorithms to address our research challenges. By the end of the semester, we completed a research paper that was accepted by ISIT, the flagship conference of the Information Theory Society.

In the future, I plan to foster a supportive mentoring culture within my own research group. I will welcome students from both undergraduate and graduate levels to participate in research and guide them in cultivating strong research motivations and advanced research skills.

Lecture Notes Development Experiences In addition to the teaching and mentoring experiences, during my undergraduate study, I had the privilege of developing lecture notes for entire courses using LaTeX in several science and engineering classes, including Real Analysis, Linear Algebra, Topology, Theoretical Foundations of Deep Learning [2]. From this experience, I find developing lecture notes is an effective way to explain and teach course materials to myself once again. Besides, my classmates found those materials extremely valuable when they were reviewing course materials. Some of my instructors even adopted the notes as core materials for future iterations of the courses. This experience was deeply fulfilling and laid a strong foundation for my appreciation of teaching and mentorship, which continues to shape my academic journey.

[2]These notes can be found available at https://walterbabyrudin.github.io/course.html.