Teaching Statement Industrial Engineering & Management Sciences
Wei Xie Northwestern University

My personal experiences as a teaching assistant and student trigger strong enthusiasm and passion to be a teacher. I believe that a successful teacher is made of three critical building blocks: knowledge, passion and student-centered teaching approaches. These building blocks have an enduring, cyclical relationship.

Rich knowledge is necessary for a good teacher. An instructor should have a clear idea about the purpose of the course, the important topics to be covered and the relationship between this course and other courses. Further, the instructor needs to know the difficulties students might meet during their learning process and how to guide them to overcome these problems. The comprehensive courses I took at Northwestern University (NU) prepared me with the required knowledge to teach various courses in operations research and applied statistics, e.g., discrete-event simulation, data mining, time series analysis, optimization, stochastic processes, queueing theory, supply chain, production system and design of experiments.

Effective teaching also depends on some other factors: strong passion and appropriate teaching approaches. There is no single standard teaching style suitable for all different courses. An introductory methods course, e.g., introduction to probability and statistics, typically requires a different teaching style from an advanced application course. For an introductory methods course, the instructor first needs to find comfortable ways to introduce the abstract mathematical concepts to beginners. Even for the same important concept, the instructor needs to use different teaching methods to make it acceptable for students with various backgrounds. This requires more patience. Then, various examples can be used to demonstrate how to apply the concepts and a lot of exercises become important for students to feel comfortable with the basic knowledge. However, for an advanced application course, the challenge becomes teaching students how to apply the theoretical knowledge they learned before in other courses to solve problems that are closer to the practical problems. For example, in a supply chains course, we need to use queue theory learned from stochastic process to solve practical manufacturing problems. These problems are much more complex and they are not formulated as mathematically clearly as those we meet in the introductory methods courses. Thus, students need to master the skill of how to deeply think through the problems so that they can correctly model and then analyze them. This indicates that the teaching approaches should be different from introductory to upper-level courses.

A student-centered philosophy can guide instructors to find appropriate teaching approaches. Since the "appropriate" is relative to the students, the first and most important step is to know our audiences, e.g., what background and what expectation they have from the class. This information is typically collected at the beginning of semester. In the first class, each student might give a short presentation about her/his background and expectation about this course. The students' background is important for preparing the teaching content because many courses have some pre-requisite knowledge. For example, in a logistics course, the students might be expected to take linear programming before so that they know various network flows and they are familiar with primal and dual problems. If many students

lack the pre-requisite knowledge, the instructor should provide some lectures for students to catch up.

Based on the information collected from students, the next question is in what way we want students different from when they entered our classroom on the first day of the semester. Thus, based on the purpose of the course and the background and expectation collected from students, I would articulate what are the learning objectives, what strategies I plan to use to help them achieve those goals, and how I would assess if my students reach the objectives. These three aspects should be consistent to each other. That means the teaching methods and activities should teach toward the learning objectives, and the assessment drives students' learning approaches to the objectives. For example, for a discrete-event simulation course, I want the students to know how to use the simulation to model and analyze various practical problems in manufacturing, supply chain, health care and service systems. When students are faced with a complex practical system, the first and critical step is to think through it carefully so that they can correctly model and analyze it. This thinking process could be hard. The corresponding skill can be developed and refined through practice. I would guide students gradually developing this skill through studying various practical examples together in class and demonstrate to them how to analyze these problems step by step. To assess students' learning, I would assign several group projects. For each project, a few (2-3) students in the same group should work together because knowing how to effectively cooperate with colleagues is important for their future career. I would keep tracking how well the project progresses and provide help or suggestion as needed.

By working with some excellent teachers in my department, I not only observed how a successful instructor should be but also accumulated rich experience interacting with students from low to upper grades with various backgrounds. I also attended northwestern's year-long teaching certificate program, which prepared me for how to design, deliver and evaluate a course. With my passion for teaching, I am confident that I will be a good teacher.