## Teaching Philosophy

Teaching is one of the core responsibilities of an engineering faculty member. Undergraduate students come to learn an existing body of knowledge; graduate students focus on finding and filling gaps in an existing body of knowledge and advancing it further. It is my responsibility as an instructor to facilitate this process by creating an environment where learning and innovating feels rewarding. I strive to ensure that students are learning the concepts taught in class and are able to apply them in the real world. As a student, I always focused on understanding concepts and I was able to solve seemingly different problems based on the same concept while many of my classmates who focused on rote memory could not. I was the go-to person for science and mathematics during high school.

As an instructor, I will study students background and identify necessary fundamental theories that some of the students might be lacking but are important to understand the concepts taught in the class. I will briefly present those theories before diving into the major concepts. I will present work out examples and short in-class exercises to keep students engaged. In-class exercises encourage students to ask questions and their answers benefit the entire class. Learning, applying, and practicing various engineering concepts inside and outside is essential to ensure deeper understanding of the concepts.

In order to prepare myself as a successful instructor, I have participated in a number of teaching and mentoring activities as an instructor, teaching assistant, and mentor. During my graduate studies at Iowa State University and the University of Nevada Las Vegas, I have instructed an undergraduate course and have worked as a teaching assistant for five graduate and undergraduate courses. As an instructor and teaching assistant, I utilized my previous experience as a student, to improve courses. As a student in *Construction Engineering (CONE) 381/481: Bidding Construction Projects*, I was overwhelmed when entire course content of the semester was made available at once. I also felt the lack of clarity in assignments and lack of course materials to review lectures. As an instructor for the class in the following semester, I improved course materials, prepared new materials, developed grading scales, and posted the course materials weekly to make it easier for students to get most out of the class. I also updated syllabus; coordinated with contractors and Iowa DOT staff for guest lectures and mentorship opportunities; graded homework, quizzes, and tests; and managed the Blackboard online learning system for the course. Some of the students told me that the class was easy–I believe the changes I made to the course contributed, in part, to make them feel comfortable.

I developed a lecture for *CE 595: Research Methodology in Construction Engineering* based on knowledge I acquired from *Research and Evaluation (RESEV) 570: Survey in Educational Research* course. Nationwide surveys are conducted as a part of many construction researches, but students often lack knowledge to properly design effective surveys and analyze the results. From the lecture, I was able to communicate some of the principles for effective survey design such as ensuring consistent meaning to all respondents, removing any possible biases, adding “do not know” option, and having data analysis plan while designing the survey. Several graduate students developed survey questionnaires in following semesters and utilized some of the principles I taught in the class.

I took *Graduate Studies (GR ST) 585: Preparing for Future Faculty* class that introduced various aspects of faculty life such as working with students, community services and outreach, and conducting research activities. I learned the concept of flipped classroom where students watch prerecorded lectures and take online quizzes or activities outside classroom. Then, instructor lead in-class discussions and student practice the concepts they learned from the lectures. I am putting this model in practice in *CONE 322: Construction Equipment and Heavy Construction Methods* in Spring 2015.

I mentored three graduate students from construction research group. I introduced them various Geographical Information System (GIS) tools such as Inverse Distance Weighted (IDW); data mining techniques like Artificial Neural Network and available software such as R, Weka, MS Data-Mining add-ins for Excel; and literature search websites like Google Scholar, Engineering Village, and Transportation Research Information Services (TRIS). I guided them to write papers and thesis from scratch and suggested them relevant courses for their research. I also mentored five undergraduate students from various engineering departments through the Engineering Mentorship Program. It was focused on the transition from high school to college and from undergraduate school to graduate school. These mentorship opportunities better prepared me to become a faculty member as well as a better student as I get to understand the mentor’s perspective as well as mentee’s perspective.

As a faculty member, I would like to develop and instruct courses on core construction engineering topics as well as interdisciplinary topics. As a teacher of construction engineering courses, I am interested in risk management, cost estimation, project management, and scheduling. I feel the concept of risk management is essential for the successful execution and management of large scale and complex projects and that its importance is sometimes not emphasized. Interdisciplinarity is also important to me and I would like to develop courses on interdisciplinary topics such as data mining for construction engineers. The amount of digital construction data has been increasing rapidly with the introduction of digital project delivery systems and paperless construction. Construction engineering students need data-mining skills to extract and analyze data collected throughout project life cycles. The course would include an introduction of Structured Query Language (SQL); data mining techniques such as regression, decision tree, artificial neural network, and support vector machine; and data visualization techniques such as Geographic Information System (GIS). The skills they learn in this class would be key for data-driven decision making for industrial career as well as for writing quantitative research papers.

I would encourage students to get involved in engineering and non-engineering student clubs which helps students develop communication and leadership skills that are essential for personal development. Development of those skills is sometimes neglected in engineering education as I noted from an industry representative’s view during Industry Advisory Panel meeting for Construction Engineering at Iowa State University. I would give some points in my courses to encourage students to be active in at least one engineering club. I would also assign group projects to increase interaction between students.

I believe I am well prepared to begin my journey as an assistant professor: instruct undergraduate and graduate construction engineering courses and develop new courses based on my knowledge and experience. I have Engineer-in-Training (EIT) certificate and am able to take Professional Engineer (PE) license exam. As a new faculty member, I will continue my involvement in teaching and mentoring workshops and seminars to sharpen my skills. I will utilize findings from researches on pedagogical approaches to improve the effectiveness of my courses.