

## Teaching Statement

I enjoy the process of teaching very much, be it to undergraduate students, graduate students, or to a research audience. I especially like the challenge of simplifying sophisticated and abstract ideas and making them accessible. I also enjoy interacting with students and witness their maturation in understanding, problem selection, and creativity.

Throughout my academic career, I have had many opportunities to give lectures and talks. At Seoul National University, I helped students as a teaching assistant, was involved in the development of class projects, and participated in teaching as a guest lecturer. I was also invited to give one day tutorials in non-academic institutions and industrial companies. In the process of teaching, I have found that my efforts to manage complex concepts accessible to audiences often unveil new aspects of the subject, and lead to a deeper understanding for myself. These efforts are also rewarded by increased interest from audiences and improved performance from the students. I have greatly benefitted from the positive feedback, constructive comments, and criticism from my students, colleagues, and professors.

I can teach a variety of classes in Electrical Engineering. At the graduate level, I am interested in teaching both introductory and advanced courses, including introduction to communication networks, random variables, optimization and control theory, queueing theory, graph theory, information theory, and stochastic analysis of wireless networks. I am also very interested in teaching courses at the undergraduate level, since it is important for students to have a strong background in the fundamentals of engineering. I can teach most undergraduate level courses in the areas of communications, networking, and control system.

Based on my own experiences, I believe that it is very important to bring a balance between theory and practice in teaching. To accomplish an in-depth understanding of abstract ideas and complex systems, theories enable students to focus on the essence, and practice helps them to obtain a greater understanding of these concepts. I have found that when students see the application of the theoretical foundations, they are more interested and get motivated to learn. I would also strongly encourage class participation and discussions. I believe that this helps students think about concepts more deeply and become better prepared for research or industry.

Regarding new courses, I am interested in developing the following courses.

**An Analytical Course in Wireless Networking:** This course will aim to teach students theoretical aspects of wireless communication networks. Its focus lies in formulating network problems with the relevant performance metrics and developing their solutions based firmly on theoretical foundations. I plan to bring interesting problems in the fundamentals of wireless communication systems such as power control, scheduling, routing, congestion control, and medium access. Since these have different objectives and constraints, they should be designed and evaluated in different ways. For each problem, I will present how theoretical techniques can be applied to solve the problem and how performance metrics have to be defined accordingly. They will result in a low-complexity and high performance solution, and an implementation example of the solution will be provided. The course will cover important theoretical tools and techniques including convex optimization, control theory, graph theory,

game theory, information theory, and stochastic analysis. Homework will be assigned for students to practice learned techniques and to check their results through simulations. As a final project, students will be required to define a problem in wireless network areas, develop its solution on theoretical basis, and evaluate the solution through simulation.

**Network laboratory:** In-depth understanding of protocols and algorithms in communication networks can be better obtained by attempting to implement them in practice. The goal of this course will be to deliver to students implementable aspects of networking algorithms. I plan to start this course with well-known protocols in the area of congestion control, routing, scheduling, and the applications. Fundamental ideas and simple example simulation codes will be provided to the students. For homework, they will be required to build their own simulation of an algorithm in each protocol layer. Since different layers have their own view of the network system, they have to be abstracted in a different way. Then, it will cover a network simulator known as NS-2. It is frequently used by networking researchers to evaluate many networking protocols, and is also freely available on the Internet. Students will start learning how to use the simulator, and have a chance to practice in creating their own simulations. I also plan to teach students implementation of network protocols using Linux. Networking codes of Linux kernel will be the main focus. As a final project, students will be required to modify the kernel to do a simple networking task.

**Introduction to Wireless Communication Systems:** Wireless communication is very attractive to most undergraduate students. Emerging wireless technologies will motivate them to learn the subject in more depth to the graduate level. This course will capture fundamental ideas in wireless communication systems. From an overview of wireless channels, the course will deliver to students a big picture of the various wireless systems, including Wireless LAN (Wi-fi), GSM/CDMA cellular systems, Wimax, Mobile IP, and sensor networks.