Teaching Statement

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The goal of my academic career is not only to advance research on networking, but also to educate and prepare graduate and undergraduate students to gain a solid understanding of computer networks, no matter which profession they will choose in their future career. My teaching activities include classroom teaching at graduate and undergraduate levels, curriculum development, and student mentoring.

1 Classroom Teaching

During the past five years, I taught six different networking courses at graduate and undergraduate level.

- EE136 - Communication Networks: Spring 2007, Spring 2008, Spring 2010;

- EL5363 - Principles of Communication Networks: Fall 2006, Fall 2007;

- EL5373 - Internet Architecture and Protocols: Spring 2006, Spring 2007, Spring 2008, Spring 2009, Fall 2010;

- EL7363 - Communications Networks II: Design and Algorithms, Fall 2006, Fall 2007, Fall 2008, Fall 2009, Fall 2010;

- EL933 - Network Measurement and Traffic Engineering, Fall 2005;

- MSTN Project Courses: EL9953, EL9963, CS6873, All Semesters

Different courses focus on different subjects in networking, and have students with different background and interest. I employ different strategies to teach each of them.

EE136 is an undergraduate computer networking course. It exposes students to the fundamental principles and designs in computer networking. I believe that students learn the best when they have interest and curiosity on a subject. I always try to motivate a problem and explain a concept using real network applications and examples, which they encounter on a daily basis, but don't have a deep understanding for. To match the learning capability of undergraduate students, I constantly adjust the pace and depth of teaching using feedback collected from quizs and homeworks.

EL5363 is an entry-level graduate networking course. Since this is a core course for MSTN program, and a sequence course for MSEE program, I often have a large number (50+) of students in my class. The challenge is to cope with students with diverse backgrounds. Some students do not have any knowledge about computer networks, some students have rich experience in network management and programming. I have learned to accommodate both groups by clearly explaining basic concepts and principles to the whole class, while presenting the latest development and challenging questions to the advanced students.

EL5373 is an extremely popular course at the ECE department. It constantly attracts more than one hundred students each semester. The uniqueness of this course is to let students learn the Internet protocols by

actually "seeing" how they work in the lab. The main challenge is to integrate the lectures with the lab assignments. I work closely with the Lab TAs to examine the performance of students in lab assignments, particularly their mistakes and misunderstandings. I will then spend extra effort in the lecture to clear their doubts and help them learn better from their mistakes. To ensure students follow the lab-based learning approach, we put heavy grading weights on lab reports and lab-based exam questions.

EL7363 is an advanced network design course. I developed the syllabus targeting for master students who will choose network design and management as their future profession, PhD students whose research fields are directly or closely related to compute networking, and part-time students who are working on network administration. Network design involves modeling, optimization, and algorithm components. Based on the background of students taking this course, I choose to mainly focus on the modeling component. There is a midterm exam to test how well students master the traditional network design methodologies. The final project is open-ended. Students are encouraged to apply what they learned in class to their own research problems or network design and management projects at work. I always feel great satisfaction when students solve their problems by creatively extending network design techniques learned in class.

EL933 is a special topic course that I developed when I first joined Poly. It introduces to students the classical techniques and the most recent research activities in the field of network measurement and traffic engineering. Each week, I cover a topic by presenting three to four research papers from top conferences and journals. Students are evaluated by a final project. Even though it was only offered once, a course project of a student group eventually grew into a very fruitful research project on P2P IPTV measurement.

As the director for the Master of Science in Telecommunication Networks (MSTN) program, I shouldered the responsibility of advising more than 120 MSTN design projects over five years. Students are encouraged to take hands-on projects, such as developing new network applications, building small-scale network testbeds, and network performance evaluation using simulation tools, such as OPNET or NS, etc. For students who are not capable of or do not have access to a hands-on project, I advise them to study new networking topics beyond our courses, especially those new trends in the industry, such as data centers, cloud computing, WiMAX/LTE, etc. For small projects, students work independently under my supervision. For large projects, students work in teams. They learn the importance of project management and teamwork.

1.1 Teaching Evaluation

Table 1 presents the results of teaching evaluation conducted by the department in the last four years [1].

Table 1: Teaching Evaluation Results in Past Four Years

Semester	Course	Enrollment	Course Rating/Dept. Avg.	Instructor Rating/Dept. Avg.
07' Spring	EL5373	43	4.35/3.92	4.58/3.86
07' Fall	EL5363	53	4.65/4.3	4.71/4.34
	EL7363	19	4.67/4.3	4.6/4.34
08' Spring	EL5373	86	4.55/4.42	4.52/4.5
08' Fall	EL7363	13	4.15/4.38	4.23/4.46
09' Spring	EL5373	61	4.55/4.35	4.71/4.43
09' Fall	EL7363	12	5.0/4.34	4.9/4.5
10' Spring	EE136	14	5.0/4.24	5/4.43

[1]Results prepared by Prof. Xiaokang Chen, ratings are in the scale of 1-5.

2   Curriculum Development

In Fall 2006, I redesigned an old graduate level course at ECE department of Polytechnic, "EL7363: Communications Networks II: Design and Algorithms". It has not been offered at Polytechnic for many years. Since Fall 2006, I have been offering it once every year. The subject of this course is network design, which consists of topology design and traffic routing taking into account dynamics in network states, such as link/node failures and traffic demand variations. Efficient design models and optimization methods are crucial to simultaneously achieve good network user performance and high savings in network deployment and maintenance. This course introduces mathematical models, design problems and optimization algorithms that can be used to guide network design practice. This course is taken by a wide range of students interested in network design, including senior undergraduate students, master students, Ph.D students and part-time students. My course slides have been adopted by the authors of the textbook as the official slides for the book.

In Fall 2005, I developed a special topic course on network measurement and traffic engineering. Networks, and the Internet in particular, have experienced exponential growth, becoming one of the largest engineering systems ever constructed. Management of this large system is of critical importance, and challenging at the same time. Measurements and models based on these measurements are integral components to understand network behavior and provide basis for better management. This course covers topics both in measurement, ranging from traffic/protocol/application characterization to anomaly detection, and in traffic engineering, including congestion control and optimal routing.

3   Student Mentoring

In my role as a mentor for graduate students, I have successfully advised and provided funding for five Ph.D. students: Chao Liang, Tan Ba Le, Xiwang Yang, Guibin Tian and Yang Xu. I have been successfully guiding a student to a research topic that matches his research interest and technical strength. Chao Liang is the winner of the Richard Rosenthal Award for ranking the first in the departmental PhD qualify exam in 2006. He has published six journal papers, ten conference papers. He has three additional pending journal revisions/submissions. He did summer Interns at Thomson Research Labs and IBM T. J. Watson Research Labs. Tan Ba Le is a PhD student originally funded by the Vietnamese government. He had some difficulty in passing the department qualify exam when he first came to me for advising. By spending more time with him, I was able to turn him around, in terms of both altitude and attitude, in about two years. Now he is highly motivated and conducting active research on opportunistic routing in wireless networks. Not only he passed the Ph.D qualify exam and area exam, he has also published one journal paper, two conference papers, with one pending conference submission. The satisfaction I felt in this case is no less than advising a more productive student, such as Chao Liang.

Other than advising Ph.D students, I also actively engage master, undergraduate, and minority students in my research projects. I have advised three MS thesis, and one BS/MS thesis. Among them, Winiga Sontoua is a minority BS/MS student. He worked with me on a TCP relay project. He learned socket programming, successfully developed a TCP relay prototype, and conducted extensive experiments on the PlanetLab. Wei Chen is a master student in the joint master program between the Polytechnic and the Southeastern University of China. Haigen Li is a master student in the joint master program between the Polytechnic and the Southern China University of Technology. Yanwei Tang is a student in the joint BS/MS program between the Polytechnic and the Nanjing University of China. In addition, I have hired many GAs from ECE and CS departments to work with me and my Ph.D students on various research projects.